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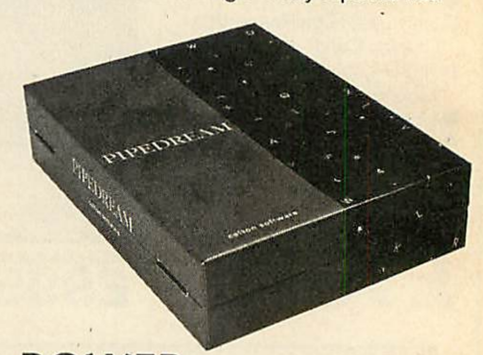
PipeDream is also 100% file compatible with PipeDream on the IBM PC, and Acornsoft's VIEW PROFESSIONAL for the BBC Microcomputer, so you could work at home on your BBC Microcomputer and take your files to the office on your Z88, to use on your Archimedes or IBM PC. No other software enables you to share your files with all these computers.

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ACORNUSER

ISSUE No 73 AUGUST 1988

COVER



EDITORIAL

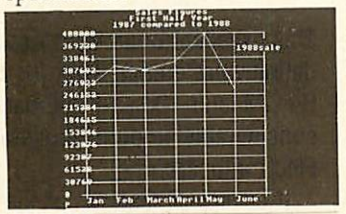
The Arc's first year passes with this issue, and it has now attracted some good software. *First Word Plus* is an excellent character-based wordprocessor, *System Delta Plus* a fine database manager, and *Artisan*, Logo and the PC Emulator stand out.

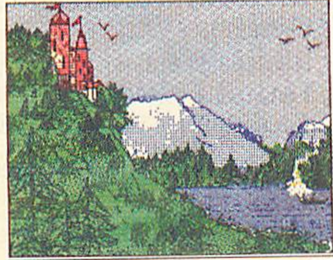
Good software is a rare commodity: innovative packages don't appear very often. There has been, over the last five years, a great deal of innovation in BBC software, and the best available is very good. In this issue we review two clear winners: *Sci*, and Pineapple's PCB design package.

But there are a host of other authors writing Arc programs that are no real advance on model B software. Faster, using more memory maybe, but not that different. The question is, can former 8-bit software houses grow up with the Arc, become more professional, yet keep their innovative streak?

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NEXT MONTH

Add GKS graphics to the Archimedes, get neater printing from *View*, plus a judgement on *Sigmasheet* and the conclusion of *Warlord*



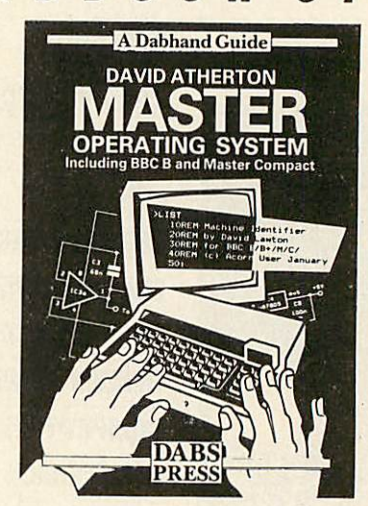
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Published by Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Tel: 01-490 1444. Telecom Gold 81: RED001. Micronet 919992492. Printed by Riverside Press, Gillingham. Typeset by Tabloid Fotoset, London. Colour by Trumps Studio, Ware, Herts. Print production by Aquarius Print and Design, London. Distributed by Comag, West Drayton. Redwood Publishing is a registered data user. ISSN 0263 7456

OFFERS

HANDBOOK OFFER



A guide to the Master Operating System

This excellent book from Acorn expert David Atherton, is the definitive reference work for programmers of the BBC model B+, Master 128 and Compact computers. It also contains a considerable amount of useful material for BBC model B and Electron users.

It covers all features of the Acorn MOS including 65C12 opcodes (including Rockwell additions), all new system calls and previously unpublished filing system notes.

The book is liberally sprinkled with program listings, which are available on disc. The *Program Disc* also contains some extra utilities.

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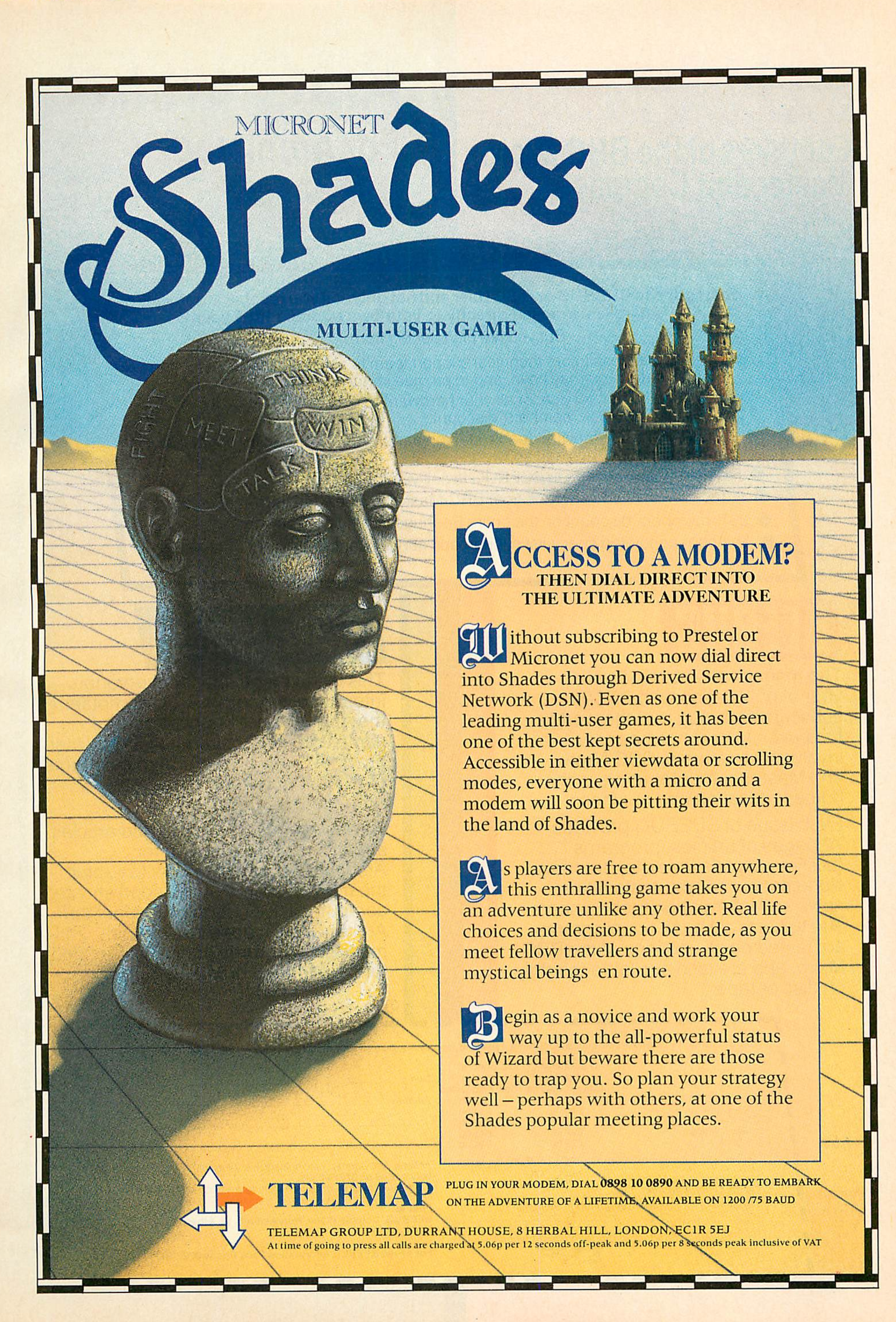
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News

Oak turns to design

A computer-aided design package for the Archimedes is the first of a series of 'professional' software from Oak Computers.

The £295 program claims to be unique in that it uses a parametric system. Most CAD programs understand drawings as sets of co-ordinates.

Oak's *Parametric Design Tool* understands them in terms of the relationships between components. This has advantages when it comes to redrawing or deleting areas, says Oak's David Driscoll.

The company already customises Archimedes hardware for its clients and is planning to build its own machine around the ARM chip set.

Easy addition

Many electronics buffs have experience in creating their own hardware add-ons. But adding to the Arc is more difficult, requiring expensive interface expansion cards.

Atomwide has produced a prototyping expansion card, to which users can attach their own chips and develop the hardware they need.

Two versions are available, a blank printed circuit board for £17.25 and a board containing interfacing chips at £40.25.

Trade wars hit micro prices

By Carol Atack

Acorn has raised the cost of two Archimedes models and many of the add-on cards. The 310 and 440 now cost £1211 and £3159 (including VAT), with the colour displays necessary to exploit the machine's graphics. This is an average eight per cent increase.

Dealer Jay Mehta, of Technomatic, said, 'I expected Acorn to increase its prices in April. Other companies have put prices up because of the memory problem.'

The fast dynamic RAM chips the Archimedes and other advanced computers use have become more expensive. This has been blamed on American protectionist laws stemming the flow of cheap Japanese components and resulting in a worldwide memory chip famine.





Page: 'reluctant' Jessa: 'backfire'

Amstrad and Atari raised prices several months ago and blamed the chip famine, but Acorn was reluctant to point the finger at any one factor for the price rises. Spokesman Michael Page said, 'The shortage of chips is a factor, but not the only one. There has been no price change on these machines for nine months and there are several things which have affected us.'

Other increases are the 0.5Mb memory upgrade for the 305, now £171.35, and the 20Mb hard disc and controller, now £573.85. The input/output expansion card will cost £97.75. The less powerful Master series and Archimedes model 305 remain at the same price.

There will be plenty more price rises throughout the computer industry as American and EEC protectionist legislation takes effect. Japanese printers are the first to be affected with the EEC imposing punitive levies on machines manufactured outside its boundaries.

Technomatic is holding the increase on the printers they sell to six per cent, although Mehta expects this to change as the manufacturers run out of pre-levy stocks.

Nazir Jessa of Watford Electronics who sells a wide range of Japanese printers, is unimpressed by Europe's reasoning. 'The whole thing will backfire because British and American manufacturers cannot produce these printers at the price or quality. I just hope that they will reconsider it.'

Olivetti buys RISC card

The first Acorn product to be bought by Olivetti is a laser printer controller for IBM PCs, and Olivetti has ordered £0.5m worth of them.

The card is powered by the ARM chip and could allow PostScript-based desktop publishing software to be used with cheap non-PostScript laser printers. The Acorn card, known as a raster image processor, could let even the dumbest laser printers understand PostScript or other page description languages.

But the card contains no software. It is up to buyers like Olivetti to supply a PostScript interpreter.

School hardware on trial

Official tests on the various micros fighting to be used in schools are being undertaken by the National Council for Eductional Technology. The council will check software compatibility by testing the machines' ability to run common classroom packages.

Last year's policy statement on micros, *New Technology for Better Schools*, stressed two points for hardware buying – flexibility and compatibility.

The report summarised the capabilities of 19 machines ranging from the Master to Torch Triple-X running Unix. The council will test the compatibility claimed for the Macintosh, RM Nimbus, and Acorn's Archimedes. It will concentrate on the newer 16- and 32-bit micros.

BBC Basic is available on most micros, and will no doubt be part of the study. Another element considered will be ability to swap files through direct links and networks.

News in brief

■ Peartree Computers has gone into receivership. The company, which built its fortunes on add-on boards for the BBC micro, lost its Acorn dealership earlier this year, and was forced to withdraw its Music 87 synthesiser after it failed to come up to scratch.

Cash-flow problems caused by over-commitment to the Music 87 project are believed to have brought the company down, although it will continue to trade under the receiver.

■ Solinet, the Solidisk user group, has set up a library of public domain software.

A series of 80-track discs will be made available, including programs such as a page editor and toolkit ROM. Although submissions are invited, would-be contributors are reminded that submissions must be copyright free and the author must be made aware that the program has been sent in.

■ Solinet is not the only group with an interest in public domain software — which has become big business for the IBM PC and Apple Macintosh. The Northern Ireland computing company Tempo Systems aims to get in on the act with a new division formed specifically to gather and distribute public domain software for the BBC micro.

■ BBC micro users who prefer gentler, traditional pastimes to violent shoot-em-up games, should read the latest catalogue from Great Elm Services. This includes crossword and word puzzle games for the BBC and the Electron. Top of the range is a crossword writing program, at £28.50.

As only one key needs to be pressed it is suitable for use by the disabled; small crosswords can be shown in a large format for those with poor sight. Number and word puzzle creation programs also feature in the range.

Arc swings into music

Music looks like being the first of the niche markets Acorn is to exploit with the Archimedes. An expansion card to link to electronic instruments fitted with the MIDI standard interface is to be launched later this month.

The BBC B has already had some success in reaching professional musicians — including chart toppers Erasure and Ultravox — with MIDI equipment from UMI, and the Hybrid Music 5000 system.



Erasure are among the top groups using Beeb-based MIDI gear

Acorn is making a first appearance at the British Music Fair in Wembley to show off the expansion card, which costs £79.35 and includes MIDI in, out and through ports. Additional chips will be included to enable the Arc to control external musical instruments and to make its own sounds simultaneously if required.

Archimedes users who have already bought the input/output expansion card can buy a MIDI add-on for £44.85. This contains the in and out ports but not the through port or the processing chips.

Acorn's David Bell said: 'Music is a fast-growing area of the computer market. If you walk down any high street you will see MIDI keyboards for sale in the shops.' He is working with third party developers to ensure that the machine's MIDI capability is adequately supported by software.

For example, Armadillo Systems is working on professional quality hardware and software to make use of the card. This should be available in September. Another partner is Electro Music Research whose Soundsynth system is aimed at the home user.

Armadillo Systems is further exploiting the Archimedes' speed with the release of a Fourier analysis program. The program, *Spectre*, takes a sampled sound and splits it into its separate harmonics. These are displayed on screen in either two or three dimensions, and can then be edited.

Because of the Archimedes' speed the analysis can take only 10 milliseconds as opposed to the 30 seconds it would take on a BBC B. For the first time a home computer can be used to perform Fourier functions such as real time spectral analysis. The program costs £46, or £161 including the sampler expansion card and software.

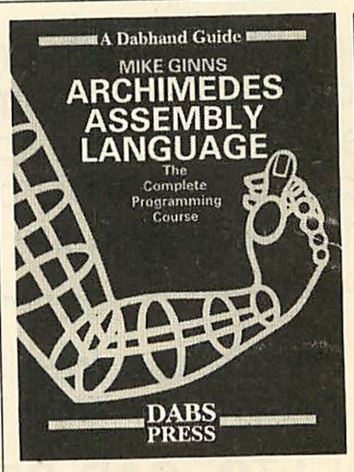
Two new Dabs guides

Dabs Press has published two more books for BBC and Arc users. First is *C: a Dabhand Guide*, by Mark Burgess.

This costs £14.95 and includes chapters of specific relevance to the BBC and the Archimedes, as well as introducing the language.

Support discs are available in Beebug C for the BBC and Zorland C for the IBM-compatible Master 512.

The second book is Mike Ginns' *Archimedes Assembly Language*, also £14.95.



Meanwhile, the software side of Dabs is moving into the games market with an Archimedes shoot-em-up, *Alerion* for £14.95.

Word search

If you turn to a regular dictionary to check on computer terminology, you'll often be disappointed. The latest technical jargon simply isn't there. The new *Chambers Science and Techology Edition*, heavily revised is the answer.

Its 45,000 entries cover all the main branches of science and technology, and computing entries include names of languages and abbreviations as well as the usual gobbledygook. The 1000-page paperback is a reasonable investment at £16.95, with the hardback weighing in at £30.



Masters at work

A husband and wife team based in south Cambridgeshire are using the Master to power their marketing, typesetting and office services company. Ryecroft Data was started three years ago by John and Christina Clark with the aid of a BBC B computer, *Wordwise* wordprocessing software and a printer. Since then two Masters and an IBM-compatible have been added to the company's offices (above), with an Archimedes on its way to link the machines. The company offers secretarial services such as wordprocessing business letters, plus typesetting and design work. Ryecroft will also maintain a database for companies and send out mailshots.

Wordwise Plus files are fed through Telecom Gold to typesetters Wordstream in Dorset. Bromides are returned the next day ready to be made up into documents by Ryecroft.

Fancy fonts for 24-pins

Users of 24-pin dot-matrix printers often find that their software is not sophisticated enough to generate the special characters their printers are capable of printing.

Wordpower, a BBC wordprocessor which runs on all Acorn machines from Electron to Archimedes, has long had the flexibility of output to do this. But the increasing popularity of 24-pin printers has led program developer Ian Copestake Software to release a wide range of what it calls 'power fonts'. The *Wordpower* program with one font costs £63.25 and extra fonts are £21.85 each.

The power fonts can also be used with other programs. Typefaces — which include Irish Gaelic, chemistry symbols and APL characters — are supplied on disc to be downloaded into the printer. Educational site licences are available for all products from £100.

School software appeal

A Lancashire school is appealing for software to help it run its annual community computer camp during the summer.

Staff at Kaskenmoor School in Oldham expect up to 400 disadvantaged young people to take the courses, along with other members of the community. Older students, the unwaged and housewives will receive courses in business computing, using the school's BBC micros, Archimedes and PCs.

Camp director Mike Humphrey believes that this will be a good opportunity to impress them with new programs. Further details from the school on 061-681 4116.

THE COMMS COLUMN

■ Prestel has increased its pricing structure from July 1, raising the annual subscription charge for the first time in five years by 21 per cent (to £20 per quarter for Prestel and Micronet) and raising the peak-time access charge by 17 per cent to 7p per minute.

A further change is that off-peak access, previously free, is now charged at 1p per minute, and Saturday between 1pm and 6pm at peak-time rates. Subscribers to Prestel who do not use Micronet face a quarterly subscription of £8, up from £6.50. Business users are now charged £30 per quarter for the combined service, £18 for Prestel alone.

Two concessions have been made to Micronet members to offset these charges. The *Shades* and Teletalk areas, which already carry a time charge of 3p per minute, will not carry the 1p charge as well; and time on the system will still be free from midnight until 8am, while (and only while) accessing Micronet pages. That means it will be cheaper to chat with chatlines than through mailboxes, as Mailbox is not part of Micronet. Micronet's managing director John Tomany claims to have 'fought very hard' for these changes.

■ Another price change which was notified at the same time concerns Interlink, Micronet's Telecom Gold gateway. The residential subscription charge for this has been reduced so that the total charge for Micronet, Prestel and Interlink access is £23 per quarter, and there is no Gold registration fee (this is unchanged).

This effectively means that Interlink now costs £1 per month, cheaper than rival Microlink – but remember that the latter has the old charging system where no charge is made for the amount of text that is actually sent.

■ Micronet users Melanie Weaver and Jez Thorpe have become the first couple to marry after meeting in Telemap's *Shades*, multi-user game. Their characters met in the fantasy game while roaming in the woods around the castle. They actually married as characters in the game, and then four weeks later, got engaged to each other, and recently had a real live wedding at a church in Cornwall.

■ On the subject of *Shades*, the game is now available to non-Micronet subscribers via the BT Value Added system on (0898) 100890. This is, of course, one of those 25p per minute (38p in peak hours) numbers. The game is part of Funtel, a new service from Telemap which replaces Hotel California, which apparently was a three-month experiment. The number is the same as Hotel California's. *Shades* is the main part of Funtel, although there are other on-line games and competitions. You pay for the services through your normal BT phone bill.

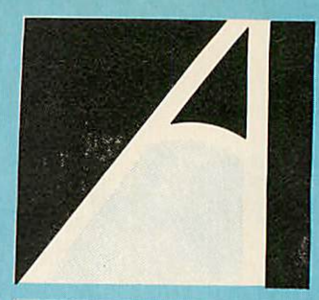
■ The bulletin board in the spotlight this month is the Dwarven Realm, run by fantasy role-playing game (FRPG) enthusiast Peter Jones, also known as Thanatos. FRP gameplay is, as you might expect, conducted on the board, but Peter is a Beeb enthusiast, and you could occasionally find this showing through.

The system runs on a Model B with 56Mb Viglen Winchester in Viewdata format (Prestel software, 1200/75 modem) on (0376) 501036. This is a recent number change following Essex-based Peter's move from Ilford to Witham.

David Atherton

Have you got any comms news? If so, contact David Atherton either at Acorn User, or on his mailboxes, Prestel 942876210 or Gold 72: MAG11596.

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BEEBUG – The Archimedes Specialists

Prestel rise angers users

British Telecom's Prestel service has increased its subscription and connection charges and provoked an angry response from users. What has upset them, especially home users who subscribe to on-line magazine Micronet, is the introduction of a penny a minute charge for evening use of the system. Before the price rises off-peak use only cost the price of a local phone call. For the users who only log-on on weekday evenings this represents a huge increase.

Acorn User's Prestel mailbox has been jammed with letters from irate Micronetters. 'This will kill the system for home users. Please try to do something about it', said Tim Dedopulos. Many feel that while business users would not notice the six to seven pence a minute rise in the peak charges, the introduction of the evening charge will deter home users.



Telemap spokesperson David Rosenbaum replied that there was no time charge between midnight and 8am. 'If someone logs on for an hour a week in the evening it's only going to cost them the same as half a pint, which is still good value for money.'

Telemap has offset the increased Micronet subscription charges with Interlink, providing improved access to mail service Telecom Gold. Personal subscriptions rise from £66 to £79.95 a year and the business rate has risen to £119.95.

Computer journalist Steve Gold commented that the new charges could hit both Micronet and Prestel hard, with Micronet standing to lose subscribers unwilling to pay time charges. 'My main worry is not that British Telecom will close the Prestel service but that it will stop serving the general user and become aimed at specialist areas', he said.

Meanwhile Telemap is expanding away from its Prestel base with the launch of a new division, Funtel, accessed on 0898 numbers. Services include the Hotel California entertainment service.

Arc gets started

The latest major software release for the Archimedes is Mitre Software's relational database manager *Flying Start II*.

'What made us do a version for the Archimedes was that we liked the machine' explained Mitre's Gerald Hill. 'The new version is the same as the PC version except that it runs much faster with RISC.'

The package includes a demonstration disc to show the features of the database, and sample data is included to show practical application. With the program disc and documentation the package costs £99.

This package is already familiar in its IBM PC version, which was under the Arc's PC emulator. The latest version works in the Arc's native mode, making full use of the ARM chip's speed.

Wordprocessing tops with readers

Wordprocessing has overtaken programming as the most popular activity for *Acorn User* readers according to the survey in May's issue.

Over 1500 people replied to the survey. 1189 listed wordprocessing as one of their top five activities, while 1113 named programming.

The most popular machine is the BBC B owned by 57 per cent of respondents. Arc owners make up 7 per cent, three-quarters of them having kept their Acorn micro. Interestingly, most had a 310 or 440, rather than the cheaper 305; shades of the model A?

Hints and Tips is the best section in *Acorn User*, say readers, followed by Letters, News, and Joe's Jottings.

Over a third of the replies came from readers in education. One in six is a teacher. The influence of Acorn machines was shown with one in five readers being in engineering, computing or research. 14 per cent were self-employed or in professional or managerial positions.

When it came to suggestions for articles, one of the most popular was a history of Acorn. This is in fact already underway with part one in the next issue.

The winner of the Arc was Nigel Potter of Reading for his suggestion of a series of articles on designing dance steps using footprint icons. Sheer originality won through. J van der Post in the Netherlands with utility programs for form filling, and N Phizackerley of Lancaster on mapping two-dimensional data, both won Compacts.

Clean sweep

While there are electric simulation circuits on the BBC micro there is not much equipment to verify the behaviour of real circuits.

Add-on B-Sweep produces frequency response graphs by sending a sine-wave through the circuit. Manufacturer Melford Designs believes that the £95 unit will be useful for education as well as industry.

CAD book

Designs on your Desktop is a new book which sets out to explain the benefits of computer-aided design (CAD). It aims to cover all aspects of computerised design and convert everyone from the managing director to the newest staff member to using computers. It covers various aspects of CAD and three dimensional modelling. Written by engineer Harry Atherton the book is published by Sigma Press for £11.95.

Archimedes

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Video control needs good software

Video guide

People writing interactive video programs face a bewildering choice of authoring programs. These packages are designed to make it posible for non-programmers to write interactive courseware. But the range is so wide that newcomers may find the choice of software difficult.

To help them make a decision the National Interactive Video Centre has published *Authoring Packages: A Comparative Report*, covering eight of the most popular packages and includes a detailed evaluation and comments from users.

Space age

Space Apprentice is the latest educational simulation adventure from Magnolia Soft. The company took three years to put it together after getting the idea from a BBC Zigzag project. Children and teachers played a part in the development of the program, and the finished product is intended to appeal to the 10-14 middle school age range.

Teachers can customise up to 11 commands to adapt the program to their own lessons. Plenty of off-computer work is included to encourage children to solve problems rather than simply treat the program as a game. They should approach the program as a group rather than as individuals to gain the fullest benefits.

The program costs £17.50 for a 40-track disc containing the BBC B version and an enhanced Master Version.

Teachers fear poor technology image

Concern that computing and information technology teachers are being left out in the cold has led to a new lobby group being formed.

The Association of Computing and IT Teachers aims to support high-quality teaching and to promote understanding of its value and relevance. London computing inspector and ACITT founder Bryan Weaver explained: 'Computing teachers often began in a different subject and have only received a small amount of in-service training in computing. There is a lot for them to learn.'

Other members of the association include teachers and authority advisers. Its committee includes representatives from MUSE, the Computer Education Group and the British Computer Society's schools committee. Many are concerned that computing and IT-related studies are undervalued, and that computing teachers are often isolated within the school: 'Often a computing teacher is the only one in the school. Where English teachers can discuss new developments and problems together, the computing teacher cannot share difficulties except in group meetings arranged by the LEA.'


IT is well supported in Manchester Poly, but still needs promoting

ACITT is being launched with a conference at Digby Stuart College in London from July 15 to 17. It costs £75 including accommodation and £55 without; both figures include the association's £12 annual membership fee. Further details from Romford Educational Computing Centre on (04023) 49115.

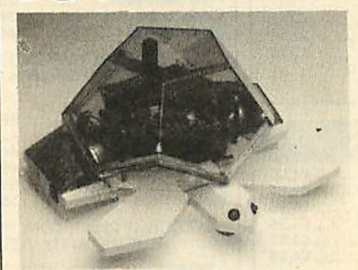
Questions the association will tackle include whether more resources should be devoted to training.

Look and learn

Two conferences this summer aim to revitalise teachers' interest in computing. The first is by MUSE, the Microcomputer Users in Education group, from July 25 to 27.

Lectures and workshops will cover many topics, including computerised administration. Acorn will be attending to demonstrate the Econet system.

The second is the annual conference of the British Logo Users Group. Held at the College of St Paul and St Mary in Cheltenham from September 2 to 4, the conference costs £90 with accommodation or £35 for Saturday entry only. There are reductions for group members. All teachers, teacher trainers and researchers with an interest in computers and the Logo language are welcome. This conference also features an exhibition and workshops.


Logo users get together

Report on IT in curriculum

The Technology Education Project, based at King's College, London, has issued its first report. The project was based on the urgent need to develop a useful technology syllabus to equip students for modern society. It examined ways in which the subject could fit into the planned national core curriculum.

The report should be percieved as useful by students and should form a coherent part of the curriculum. Copies from the Centre for Educational Studies, 552 King's Road, London SW10.

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Next month

The graphics kernel system is a graphics standard widely used on powerful micros and minicomputers. Guy Martin and Gary Phillips show how they've implemented GKS in Basic on the Archimedes.

Alan Watkins describes his experiences upgrading his 305 with extra RAM, a backplane and a Winchester disc. Peter Voke continues the adventure theme, with a description of the adventure generator used to write *Warlord* and the text compression scheme.

And Graham Bell shows you how to use microspacing in *View* on a dot-matrix printer.

BLUNDERBOX

There was an error in July's Agora. A line was omitted describing Stuart Turgis's disc compaction program. "ADFS FreeSpace" actually returns with register R0 containing the amount of free space on the disc and the size of the largest single area of space in register R1. The two values are compared and, when the same, the disc has been compacted.

Compact prize

The winner of our April competition, held in conjunction with the British Trust for Conservation Volunteers, is Mrs M Oldham of Rossendale, Lancs. She wins an Acorn Master Compact computer. Runners up who each receive an Acorn vase are John Cooke of Stockport, Mrs PM Gilbert of Manchester, AJ Gibbons of Torquay, CE Kerr of Littlehampton and Mrs E Nightingale of St Mary, Jersey. Congratulations to all the winners.



Mrs Oldham's reward

New discs on order

Because our 3.5-inch discs have proved so popular we are making it easier for you to buy them. Starting with this month's disc, featuring our adventure, they will now be available just like 5.25-inch discs from the order form on page 101; 3.5in disc subscriptions will also be available, starting from September's issue. However discs up to and including July's should still be ordered separately as before. Write to Acorn User Monthly Disc Offer, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ, enclosing a cheque for £7.95 made out to Redwood Publishing.

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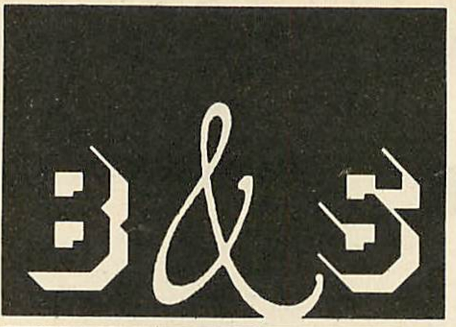
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Zarch (Superior)	£15.95
Minotaur (Minerva)	£11.95

Terramex, from Bugbyte, is a classic conversion from the Atari ST and Amiga.
Missile Control is about as close to the original arcade version you can get.
Hoverbod is an arcade adventure with devious puzzles and excellent graphics.

FREE HELPSHEETS/MAPS

NEW

Spend over £4 on games and you may choose any ONE of the following helpsheets/solutions and maps absolutely FREE:- Spend over £10 and you may choose any TWO FREE:-

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Rick Hanson	(Solution)
Tarzan	(Solution + map)
Stranded	(Solution)
Codename: Droid	(Solution + map)
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Repton 2	(Helpsheet + map)

NEW

SHARK (ASL)

You are a lone fighter in this very good arcade adventure. There are 3 levels - the jungle, an oil refinery and a derelict town. Untold aliens will attack you in this game - it's similar to Ghosts 'n' Goblins. Don't miss it!

BBC/Electron Cassette £7.50
BBC 5 1/4" Disc £9.50

BREAKTHROUGH (ASL)

Another very good game from ASL. It is similar to Solomon's Key and features 100 different screens.
Set in a world of fire and mystery you must strive for your freedom. Highly recommended.

BBC/Electron Cassette £7.50
BBC 5 1/4" Disc £9.50

*= Electron disc available
M = Master compatible

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Repton Thru Time M	5.50	6.35	7.50
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Codename: Droid (Stryker's 2) M	7.50	9.50	11.95 *
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M = Master compatible

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M = Master compatible

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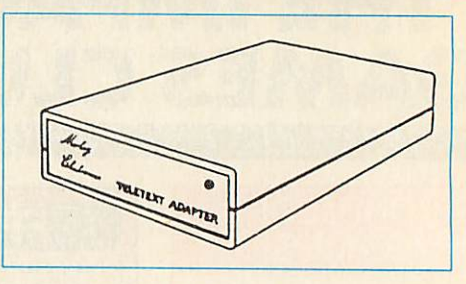
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TELETEXT ADAPTER

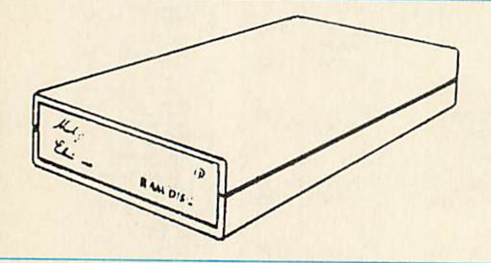
Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.
The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:
* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



WHAT THE REVIEWERS SAID:
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*
". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

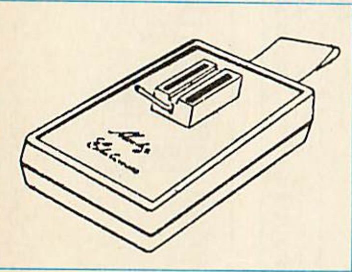
RAMDISC



Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.
THE HARDWARE
The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.
THE SOFTWARE
The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.
These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.
QUADS also available quad cartridges specifications as duels but taking 4x16k roms.

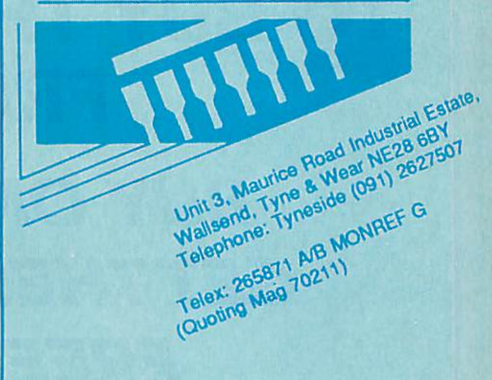
MASTER SMART CARTRIDGE

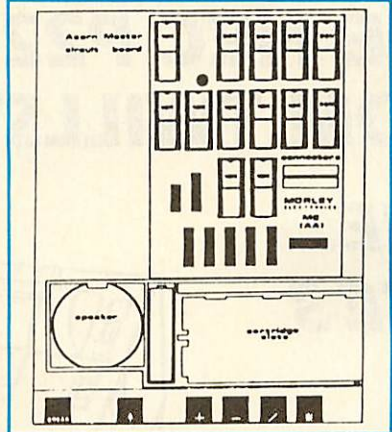
This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prive useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.
BUILT IN FEATURES (at the press of a button)
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
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User friendly menu.
Sound On/Off.

<u>ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY</u>

MORLEY MASTER BOARD 'AA'







At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/ MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

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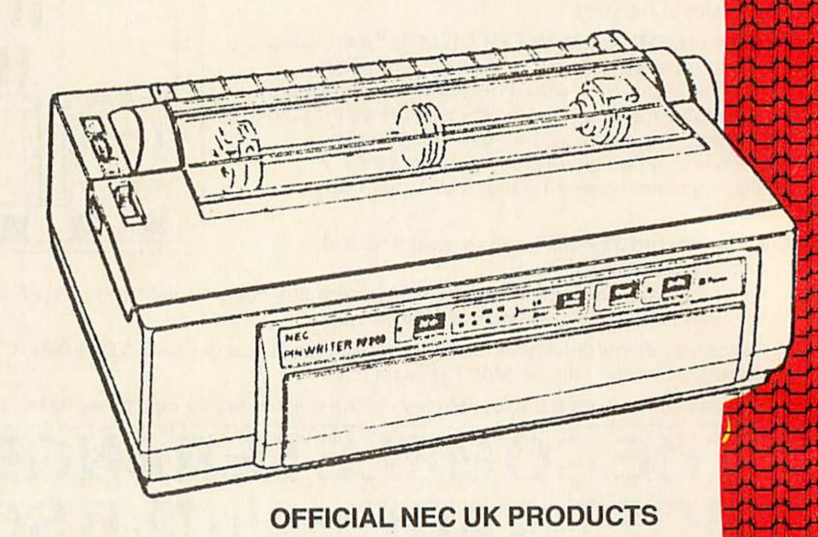
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3 PRINTER PAPER



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WHY SPEND MORE FOR PROFESSIONAL RESULTS?

Never before has a 24-pin dot–matrix printer in this price range combined such impeccable print quality with such practical, efficient flexibility. NEC's Pinwriter P2200 gives you the vital edge that will turn your printouts into the most impressive documents ever.
The P2200 delivers letter-perfect print, in several sizes, at 56 characters per seconds (cps). Or switches to draft mode for high-volume outputs at 168 cps. And it gives you a vast selection of typeface options and superb graphic capabilities.
P2200's excellence is revealed in one detail after another. Like the built-in tractor that permits push or pull feeding of continuous forms – with a tear bar for quick easy removal of receipts, packing slips. or other demand documents. And the front feed function that lets you insert cut sheets or continuous forms into the front of the printer.
When you get right down to it, comparing performance against cost, Pinwriter P2200 is the most impressive printer in its class. The printer that offers executive-class printouts at budget prices. Like we said earlier, why spend more for professional results ?

SPECIFICATIONS

Print Rate
- High-speed draft: 168 cps
- Standard draft: 140cps
- Letter quality: 56 cps

Printhead
- Impact, 24-pin dot matrix
- 0.2mm diameter
- 2 x 12 staggered array

Vertical Line Spacing
- 6 or 8 lines per inch (lpi)
- Programmable up to n/360 lpi

Resident Type Fonts and Variations
- Draft Gothic: 10, 12, 15, 17, and 20 pitches
- LQ Courier: 10, 12, 15, 17, and 20 pitches
- LQ Bold Proportional Spacing: plus condensed
- LQ Super Focus: 10 and 17 pitches
- LQ OCR-B: 10 and 17 pitches
- LQ ITC Souvenir: 10 and 17 pitches
- Italicization, emphasis, and enhancement electronically possible for all the above
- True superscript/subscript

Character sets
- ASCII standard
- IBM graphic
- Italic
- 96 user-defined characters
- 13 language character sets

Interface
- Industry-standard parallel
- RS-232C (optional)

Input Buffer
- 8K standard

Graphic Resolution
- Up to 360 x 360 dpi

Copy Printing Capacity
- Original and two copies with copy control lever

Paper Width/Weight
- 5 top 10 inches/12 to 22 lbs.
- 6.5 to 8.5 inches with sheet feeder

Dimensions (W x H x D)
- 390mm(15.4"x140mm(5.5")x280mm (11.0")

OPTIONS AND SUPPLIES

Paper Handling Devicer
- Sheet Feeder

Interface Board
- Serial Interface Board

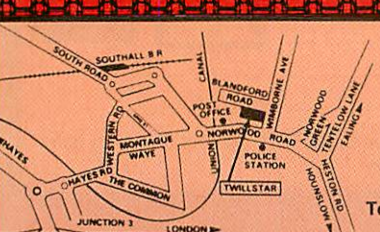
Font Cartridges
- Letter Gothic 15
- Letter Gothic 12
- Bold Italic PS
- Courier 15
- Prestige Elite 12
- Prestige Pica 10
- Courier Light 10
- Courier Light 12
- OCR-A
- Prestige Elite 12 WP
- OCR-A/Bar Code 39
- Helvette 10 PT.

Ribbon
- Black Fabric

£275.00
INCLUDES
FREE PRINTER CABLE
(for BBC, Master, Archmides, Electron, IBM Compatible Please specify)
FREE PRINTER STAND
FREE 200 SHEETS PAPER
Exclusive of VAT

SHEET FEEDER
£59.00
RIBBON £5.50

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	Exc VAT	Inc VAT
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10+ 27128 250nS 21V	3.26	3.75
1-9 27128 250nS 12.5V	3.04	3.50
10+ 27128 250nS 12.5V	2.75	3.16
1-9 2764 250nS	2.60	2.99
10+ 2764 250nS	2.39	2.75
1-9 27256 250nS	4.22	4.85
10+ 27256 250nS	3.83	4.40
1-9 TTL/Cmos set	3.91	4.50
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1-9 6264 LP 150nS	5.00	5.75
Acorn 8271 DFS	43.48	50.00

ROMS

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MEGA 3	71.30	82.00
Spell Master	40.87	47.00
View Spell	27.83	32.00
View 3 ROM	55.65	64.00
View 2.1	38.26	44.00
View Store	38.26	44.00
Overview 1811	68.70	79.00
View Professional	68.70	79.00

5¼ DISC DRIVES

	Ex VAT	Inc VAT
Cumana CSX100	91.30	105.00
Cumana CSX400	124.35	143.00
Cumana CD800S	260.00	299.00
MD400A 400k No PSU	88.70	102.00
MD400B 400k & PSU	103.48	119.00
MD802C 800k No PSU	173.91	200.00
MD802E 800k & PSU	191.30	220.00
MD802D 800k + Stand	216.52	249.00

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Philips BM7502 Green	65.22	75.00
Philips TV Tuner	56.52	65.00
Taxan KX P31 Green	68.70	79.00
Taxan KX1202 Green	73.91	85.00
Taxan KX Amber	68.70	79.00
Microvitec 1451	221.74	255.00
Microvitec 1451 Ap	260.00	299.00

(Prices inc. BBC Cable)

MASTER/COMPACT

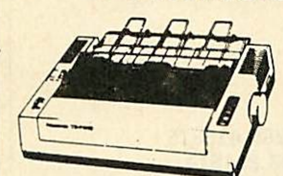
	Ex VAT	Inc VAT
Master 128K Micro	346.96	399.00
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512 Co-processor	185.00	212.75
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Peartree Cartridges from	8.65	9.95
Care Cartridges from	7.65	8.80
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Second user BBC Bs available		216.52
Philips CM8833 with BBC cable	249.00	

PHILIPS CM8833

with BBC cable

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with BBC cable & paper

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Above with Screen Dump & 2m cable

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with BBC cable & paper

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with BBC cable & paper

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KP/PW Print Ribbon	3.39	3.90
Printer Dust Cover	4.80	4.80

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	Ex VAT	Inc VAT
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Kaga/Taxan KP910/15	350.00	402.00
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Compact printer cable	7.74	8.90
IBM/Archimedes cable	7.74	8.90

Phone for our best price before placing your order

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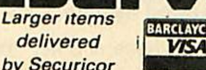
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PDT

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SEND TO:

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Product	Price	Annual systems maintenance	Telephone hot line support	VAT	Total Price
PDT	295.00	45.00	25.00	54.75	419.75
PDT	295.00	45.00		51.00	391.00
PDT	295.00		25.00	48.00	368.00
PDT	295.00			44.25	339.25

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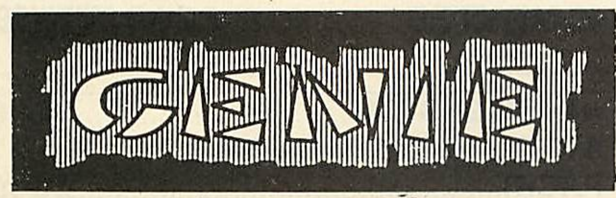
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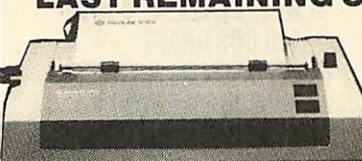
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MENTOR THE MASTER COMPATIBLE SYSTEMS

Model No 2801 Master compatible with one 40/80 disc drive
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Cased 40/80 half height, double sided Mitsubishi disc drive PLUS FREE
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WE REGRET THAT WE ARE UNABLE TO ACCEPT ACCESS OR VISA FOR SALE ITEMS

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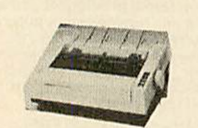
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star LC-10 £179



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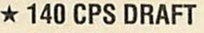


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Reference Manual Part 2	£14.95
Advanced Reference Manual	£19.95
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ViewSheet Manual	£10.00
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ACORNSOFT

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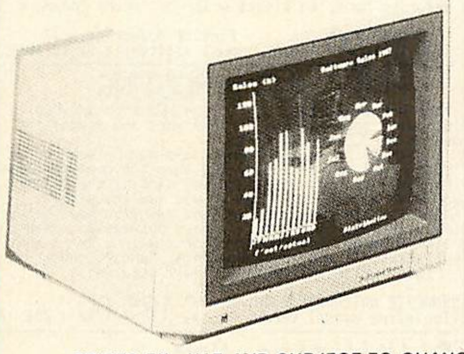
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3.5"	5.25"
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3.5" DS/DD 40 Disks & 40 Capacity Box–£39.95	5.25" DS/DD 50 Disks & 50 Capacity Box–£19.95

3.5" TOP QUALITY BULK PACKED DISKS

	10	25	50	100	150	200
Single Sided 135T.P.I.	£9.49	£22.95	£41.95	£79.95	£116.95	£154.95
Double Sided 135T.P.I.	£9.95	£24.95	£43.95	£81.95	£119.95	£158.95

Rainbow Pack of five colours – New Lower Prices

Single Sided 135T.P.I.	£12.49	£23.95	£46.95	£91.95	£129.95	£169.95
Double Sided 135T.P.I	£14.49	£26.95	£52.95	£98.95	£145.95	£189.95

Rainbow disks come in Blue, Red, Green, Yellow and Orange
All discs are supplied with labels and are certified 100% error free

BBC Printer Cable	£5.95
Archimedes Printer Cable	£6.95
Disk Notcher	£4.95
5.25" Fluid based cleaning kit	£4.95
3.5" Fluid based cleaning kit	£4.95
Mini Vac for printers/keyboards	£4.95
Mouse Mat	£4.95

SAME DAY DESPATCH



E. & O.E.

CENTEC DISK SUPPLIES

UNIT 3, THE METRO CENTRE, BRIDGE ROAD, ORPINGTON, KENT BR5 2BE
TEL: (0689) 35353 (6 Lines) (24 Hours) Fax: 0689 77737

Please note we operate a call stacking system. Outside office hours a telephone answering machine will take your order.
Remember – all prices include VAT and delivery (UK only). There are no hidden extras to pay! Personal callers welcome: Monday-Friday 9.30am-4.30pm



TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177 Fax: 01-452 1500
305 Edgware Road, London W2 Tel: 01-723 0233 Telex: 922800

ARCHIMEDES, BBC COMPUTERS & ECONET REFERRAL CENTRE

300 & 400 SERIES

Old prices valid for current stocks

Archimedes 305 Basic	£699(a)
Archimedes 310 Basic	£775(a)
Archimedes 440 Basic	£2,529(a)
Acorn Mono Monitor*	£60(a)
Acorn Colour Monitor*	£220(a)
Philips CM8833 Col Monitor*	£210(a)
PC Emulator Software*	£60(b)

Prices applicable only when purchased with the computer

ADD-ONS

0.5Mb Ram upgrade kit (for 305)	£144(b)
2nd Floppy Drive (305, 310)	£118(b)
Backplane for 2 podules	£37(c)
I/O Podule	£80(c)
20Mb Hard disc + podule	£469(a)
Acorn ROM Podule	£55(c)
CC ROM Podule	£45(c)
Midi Addon to I/O	£37(c)
Midi Expansion Card	£66(c)
Econet Network Module	£43(d)
Archimedes Printer Lead	£7(d)
Archimedes Colour Monitor Lead	£7.50(d)
IEEE Interface Podule	£283(b)

(Full implementation of IEEE 488 & 488A) Spec on request

Armadillo Sound Sampler	£105(b)
Fourier Transform Software	£40(d)
ARC/BBC Serial Link	£25(d)
ARC External Drive Adaptor	£30(d)
External 5.25 Drive	£104(b)

BOOKS: *(no VAT)*

Arc. Ref Manual	£29(b)
ARM Assy Lang Prog	£12(d)

SOFTWARE:

PC Emulator Version 1.20	£99(d)

(includes MS-DOS 3.2)

LANGUAGES:

ANSI C	£95(c)	ISO PASCAL	£95(c)
Prolog X	£181(b)	FORTRAN 77	£95(c)
LISP	£181(b)	COMAL	POA

PROGRAMMERS TOOLS:

TWIN *Editor*	£29(d)
Toolkit Plus Module	£41(d)
Software Dev T/Box	POA
Software Dev Debug T/box	POA

WORDPROCESSORS

First Word Plus	£79(d)	View SKM31 (e)	£47(d)
Graphics Writer	£27(d)	Interword (e)	£35(d)
PipeDream	£99(d)	Wordwise +	£20(d)

SPREADSHEETS

Logistix	£95(d)

(Includes spreadsheet/database/timesheets/graphics)

Matrix 3D	£159(c)

(3 Dimensional s/sheet with 19k col, 10k row & 100 pages)

Sigmasheet	£59(d)	Viewsheet SKM7 (e)	£47(d)
Intersheet (e)	£35(d)		

GAMES:

Zarch	£17(d)	Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.

Please check on availability of some of the above packages

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea)	£54(d)

Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger

Special Offer

FREE £115 inc vat VOUCHER

with every Archimedes model 310 and 440 purchased from us.
The voucher can be redeemed against any future purchase from us (inc Arc monitor, PC Emulator (at £60), discs, cables, paper etc.)
Additionally we will offer discounts upto 10% on Archimedes software and 5% on Archimedes hardware stocked by us.

GRAPHICS/ART/CARD

Artisan	£30(d)	GammaPlot	£30(d)
Artisan Support	£17(d)	System GammaPlus	£59(d)
Autosketch	£69(d)	Interchart (e)	£25(d)
Presenter	£24(d)		

(Allows importing of text into First Word+)

DATABASES

Deltabase	£26(d)	ViewstoreSKM07(e)	£47(d)
System Delta+	£57(c)	Alphabase	£39(d)
Prog Ref Guide	£26(c)		

Support modules for System Delta Plus each	£35(d)
CC MEGA 3 (incl. Interword/sheet/chart) (e)	£82(c)

FILE STORE

Acorn's new file server system

Filestore E01	£825(a)
Filestore E02	£699(a)

Full details on request

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.
Full spec on request **£299(b)**



To be launched soon
The most comprehensive CAD system for the Master. Host of innovative features for creating complex drawings, pcb layouts, sketches etc. Virtually no restrictions on drawing sizes. On screen scaling for plotters, variety of screen dumps for compatible printers.

FREE
evaluation disc available to any educational establishment. A handling charge of £3 for others. The disc contains operating instructions and will perform as release version except for file functions.

MASTER SERIES

AMB15 Master 128K	£356(a)

Includes *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.

ADC06 Turbo 65C102 Module	£115(b)
ADC08 512 processor	£99(b)

includes MS-DOS and GEM Suite

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 ROM Cart	£7.50(d)	TRC4 4ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£21(d)	Master Dust Cover	£4.75(d)

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface (for B, B+ Master)	£265(b)
Universal CoProc Adapter	£49(b)
BBC Domesday System	£3,750(2×a)

Send for detailed list of DOS software for 512

MASTER SUMMER SPECIAL
Master AMB15+512 Co-Processor for only
£420(a)
(Allow £5 extra if you would like us to fit the card for you)
512 upgrade includes 80186 processor with 512K RAM, DOS+, GEM Suite (Desk Top, Paint & Write) and Mouse
This offer valid while stocks last.
Ask for our list of DOS software compatible with 512.

MASTER COMPACT

All Compact systems come complete with 128K of RAM, 640K 3.5″ double sided drive and educational software. Additionally we include our Education/Fun software bundle to the package.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12″ Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14″ Med Res Col Monitor	£475 (2xa)
Compact 2nd Drive Kit	£90(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter (upgrades Compact to almost Master level)	£35(c)
External Drive adapter Cable	£9(d)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£49(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25, 27128-25 (12.5V Vpp), 27128-25 (21.0V Vpp), 6264LP-15, 27256, 27512
All prices on application

RAM/ROM EXPANSION

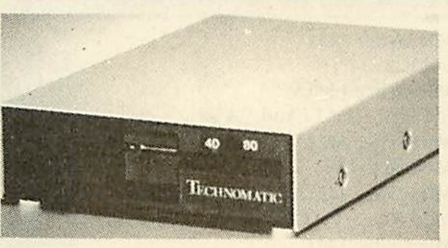
ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+ (10 Roms)	£31(c)

All prices ex VAT and subject to change without notice.

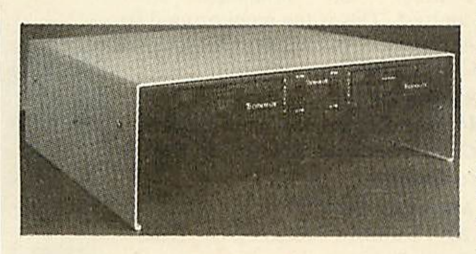
TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

TECHNOMATIC DISC DRIVES



TS 400



PD 800P

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.

5.25" Single Drives 40/80 switchable:

TS400 400K/640K	**£90(b)**
PS400 400K/640K with integral mains power supply	**£101(b)**

5.25" Dual Drives 40/80 switchable:

TD800 800K/1280K	**£170(a)**
PD800 800K/1280K with integral mains power supply	**£190(a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£209(a)**

3.5" 80T DS Drives:

TS351 single 400K/640K	**£69(b)**
PS351 single 400K/640K with integral mains power supply	**£85(b)**
TD352 Dual 800K/1280K	**£126(b)**
PD352 Dual 800K/1280K with integral mains power supply	**£149(b)**

Combo Drives (5.25" & 3.5" drives)

PD853 with integral psu	**£175(a)**
PD853P with integral psu	**£195(a)**

DISC DRIVE MULTIPLEXER

see page 5 of this ad for details

For Master, B, B+ and any DFS/ADFS

TDM2 Two computers/one drive unit	**£65(b)**
TDM4 Four computers/one drive unit	**£115(b)**

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£419(a)**
P30HD 30Mb Winchester Drive	**£435(a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£669(a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£609(a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1179(a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£546(a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£21(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer	**£28**

WINCHESTER Drive Multiplexer

These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	**£99 (b)**
TWM4 for four Computers.	**£149 (b)**

NEW

Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master. £435(a)

3M FLOPPY DISCS



5.25" Discs in packs of 10

744 40T SS DD	**£6.75(d)**
745 40T DS DD	**£9.75(d)**
746 80T SS DD	**£12.00(d)**
747 80T DS DD	**£12.75(d)**

3.5" Discs in packs of 10

80T SS DD	**£13.50(d)**
80T DS DD	**£15.00(d)**

(Add £1 for library case packing)

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box.	**£25(b)**
50 5.25" 80 T double sided discs with sleeves in lockable box.	**£32(b)**
50 3.5" 80T double sided discs with sleeves in lockable box.	**£60(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	**£14.00(d)**
3.5" Kit with 20 disposable discs	**£14.75(d)**

DISC STORAGE BOXES

DB340 Lockable 40 × 3.5"	**£8.50(c)**
DB550 Lockable 50 × 5.25"	**£6.50(c)**
DB570 Lockable 70 × 5.25"	**£8.50(c)**
DB5100 Lockable 100 × 5.25"	**£10.50(c)**

All prices ex VAT and subject to change without notice.

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON

LX800	£179(a)	**LQ500**		£279(a)
FX800	£309(a)	**LQ850**		£419(a)
FX1000	£405(a)	**LQ1050**		£589(a)
EX800	£409(a)	**LQ2500+**		£849(a)
EX1000	£549(a)			

GQ3500 Laser Printer £1249(a)

Taxan KP815 £159(a) **Taxan KP915**	£275(a)
Star LC10	£175(a)
Star LC10 Colour	£229(a)
NATIONAL PANASONIC **KXP1081*** £145(a) **KXP1082***	£172(a)
(*includes Wysiwyg ROM + Master Lead)	
KXP3131 with 38K buffer	£245(a)
Canon PW1080	£179(a)
Canon Laser LBP8-II	£1595(a)
Brother HR20 Daisy Wheel	£349(a)
Juki 6100 Daisy Wheel	£295(a)
Integrex Colour Inkjet	£515(a)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£499(a)
Plotmate A4S	£379(a)
Plotmate A3M	£549(a)
Roland 880 A3 Flat bed 8 col	£599(a)

Variety of Plotter pens and accessories in stock.

Larger Plotters available. Please enquire.

EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 × 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A).

Introductory price incl. master lead **£279(a)**

EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

★ 180cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.

★ 3K input buffer with character downloading facility

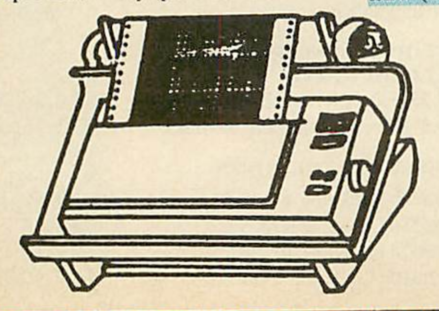
★ Fully compatible with BBC & IBM graphics

★ Centronics interface as standard

★ Price including BBC master lead **£179(a)**

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



PRINTER BUFFERS SHARER & CONVERTERS

TSB 256 Auto Sharer/Buffer

256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. **£169(a)**

Smart Printer Buffers

Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.

For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port

PP256 256K Parallel buffer	£169(b)
SS256 256K Serial buffer	£189(b)

Parallel Multi-Spoolers

Allows connecting 2 printers to 2 or 4 computers

Butter allows quick dumping of data to free the computers

COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR

MS422 4computers/2printers 512K buffer	£299(b)
MS223 2computers/2 printers 512K butter	£199(b)

Auto switching Printer Sharers

Allows 2, 4 or 8 computers to share 1 printer

Auto Self Test, READY and BUSY indicators

	Parallel	Serial
2 input/1 output	£49	£49(c)
4 input/1 output	£59	£69(c)
8 input/1 output	£85	£85(c)

All units fitted with 25D Connectors

Serial/Parallel/Serial Converters

Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols

C-PS Parallel/Serial converter	£35(c)
C-SP Serial Parallel converter	£35(c)

Add £49 to above prices for units with 64K butter

Manual Printer Sharers:

(All lines are switched).	Parallel	Serial
2 computers to one printer	£25(c)	£25(c)
3 computers to one printer	£39(c)	£39(c)
4 computers to one printer	£45(c)	£45(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12(£3.50)
2000 sheets 14½ × 11"	£18.50(£4.50)
1500 sheets A4 90gsm	£18.00(£4.00)

Labels/1000

Single Row 3½ × 1⁷⁄₁₆	£5(d)
Triple Row 2⁷⁄₁₆ × ⁷⁄₁₆	£5(d)
OHP Transparencies A4	£55(b)

PRINTER LEADS

BBC/Master Parallel Lead (1.2M)	£5(d)
BBC/Master Parallel Lead (2.0M)	£7(d)
Compact Parallel Lead (1.2M)	£7(d)
Archimides Parallel Lead (2M)	£7(d)

MODEMS

MIRACLE WS4000 V21/23	£129(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£379(b)
MIRACLE WS3000 V22 bis	£495(b)
Pace Linnet	£139(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & **BELL stds**	£92(c)

MONITORS

All Monitors supplied with a suitable lead.

12", 14" and 20" MONITORS

Microvitec 1431
Std Res, 14" **£179(a)**

Microvitec 1431AP
Std Res + PAL/Aud, 14" **£199(a)**

Microvitec 1451
Med Res, 14" **£225(a)**

Microvitec 1451AP
Med Res + PAL/Aud, 14" **£255(a)**

Microvitec 1441
Hi Res, 14" **£359(a)**

Philips 8833 14" RGB
Med Res, 14", high contract screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers. **£219(a)**

Sanyo CRT 70
14" High Resolution Colour Monitor **£149(a)**

Compatible with Master, B, Compact, and PC compatibles

Microvitec 2030CS
20" Standard Resolution RGB/Comp Video **£380(a)**

Microvitec 2040CS
20" High Resolution RGB/Comp Video **£675(a)**

TAXAN SUPER VISION 620
12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**

TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**

TAXAN 770+
MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£495(a)**

NEC MultiSync II 14"
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£489(a)**

MONOCHROME MONITORS

PHILIPS 7552 NEW
14" green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Reverse video switch, separate brilliance and contrast controls **£85(a)**

PHILIPS BM 7502
Hi Res green screen **£72(a)**

PHILIPS BM 7522
Hi Res amber screen **£79(a)**

Tilt & Swivel Stand for Philips Mono **£6(c)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)
Copy Holder Self Supporting A4	£15(c)

All prices ex VAT and subject to change without notice.

TECHNOMATIC
17 Burnley Road, London NW10 1ED Tel: 01-208 1177

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)
If purchased with Novacad	£12 (d)
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£59 (d)
STOP PRESS (Pagemaker)	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19(d)
MAX	£17 (d)
STAND ALONE MOUSE	£34 (c)
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program £29(d)

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£36 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£69 (b)
INTERBASE	£49 (d)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL (BBC)	£69 (c)
VIEW 2.1	£35 (d)
VIEW 3.0	£45 (c)
Double View Rom Version	£42 (d)
Double View Disc Version (for Master & Compact)	£33 (d)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£8 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£42 (d)
INTERWORD	£36 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£36 (d)
WINDOMATIC (A Viewsheet Utility)	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£25 (d)
ULTRACALC	£26 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14 (d)
For Master 80T	£16 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version	
For Master, Compact, B+ & B	£43 (c)
MEGA 3Rom	£76 (b)

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	£145 (b)
MACROM	£33 (d)
ACORNSOFT 'C'	£40 (c)
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All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

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WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B	6502 Second Processor,	BBC Master 128
BBC Model B+	Turbo coprocessor	All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable. **£21(d)**

MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems. **£49(d)**

BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover		Drawstick
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These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc £17.50(d)
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See the previous page for comments on compatibility.

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Do your letters look like this?
Dear Sor,
I wuold like to...
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VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d) instead of the usual £15. Offer valid while stocks last.

BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

You can play the role of British Navy in its quest to find the Bismarck and sink it or take either British or German role against another player. It requires the highest qualities of judgement, observation and decision to plan strategy and tactics to plot the death of Bismarck. **£13(d)**

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Aqueous Pen Set six pens	£18.50 (d)
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KXP3131 Sheet Feeder	£189 (a)
KXP3131 Ribbon	£4.50(d)

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Tractor Feed	£149 (a)
Sheet Feeder	£219 (a)
Ribbon (Carbon)	£2.00 (d)

BROTHER HR20

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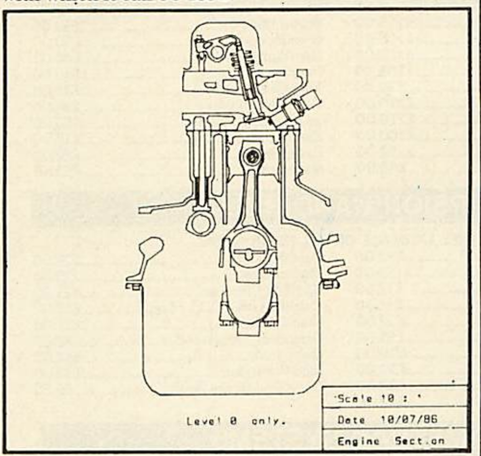
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NOVACAD Computer Aided Draughting System

Novacad can drive a plotter to produce drawings of highest quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

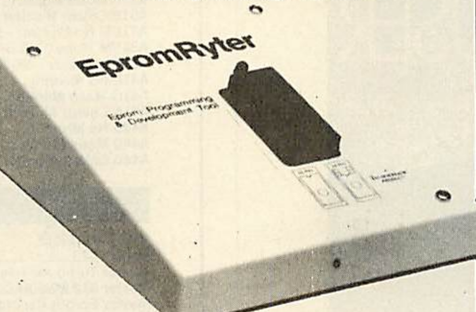
★ Simple and easy to use with logical command sequence.
★ A large drawing area (approx 15 screens)
★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
★ Zoom facility.
★ Create multi level drawings.
★ Text entry at any 90° orientation anywhere on the screen.
★ Grid scaling and locking, displacement measurements.
★ Printer routine for FX80/100 compatible printers
★ Cursor control from keyboard/tracker ball/ mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC coompatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

NOVACAD T/M Version **£49(d)**
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Plotter Driver Generator **£15(d)**

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***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**



EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
● 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
● One time eproms P27XXX, 87CXXX etc.
● Also A suffix eproms such as 27XXXA

£89(b) + VAT

META Ver III ASSEMBLER

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

● Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc – and 68000 – using native mnemonics for each processor, eg LD A, (HL) for Z80 and MOV A0, $1000 for 68000 etc.
● Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
● Compatible with Portal Eprom Emulators and Team Disassembler.
● Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc – all **during Assembly.**
● Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
● 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
● Modular source code with numeric and string parameter passing.
● Serial communicator area with eight options lines: echo, control code trap, LF suppression/ addition etc.
● Over 500 in use throughout the world in universities and many different industries.
● Two 16K Roms, two 80 track discs, A4 ring-bound manual, function-key strip.

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EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

PORTAL EPROM EMULATORS

● Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
● Load at 4Kbytes/second – No "erase" time.
● 28 pin header plugs into Eprom socket on target system – status monitored on 13 Leds.
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● 100 times faster than standard EPROM program/erase cycle.
● Fully CMOS compatible; draws no power from target system.
● Four portals may be independently programmed off same user-port cable.
● Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512). **£245(b)**

TEAM DISASSEMBLER

The third part of the Universal Development System: a Meta labelling disassembler.

Supports 1802, 8080, 8085, #HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

● Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
● Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas disassembled into appropriate directives instead of garbage mnemonics.
● Reconstituted source code ready for immediate re-assembly by META.
● Omniversal search/repalce for re-naming arbitrary label names with meaningful ones.

£145(b)

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HINTS & TIPS

DUMPING IN MIDSTREAM

Useful advice on how to achieve a screen dump while a program is running, to transfer files from DFS to ADFS, and to score accurately at Scrabble

David Atherton

Many readers may know that the IBM PC has a very useful function available from the keyboard: by pressing a key called 'Print Screen' or 'PrtSc' at any point within a program it sends a dump of the entire screen to the printer. The facility is for a text-only dump which is compatible with all printers.

Program 1 listed in the yellow pages provides the same facility on a BBC micro. It assembles and saves a program called *PrtSc* which is *RUN before using your program. At any point during the use of your program, pressing CTRL-COPY will send a text dump to the printer, without affecting anything on screen or in the program. It is particularly useful for, say, dumping individual records in a database without going through a report generator, or perhaps dumping a mode 7 screen in a viewdata program. Note that any graphics on screen in mode 7 are converted to their text equivalents, and in any other mode they are converted to spaces. You could alter the program to deal with graphics, and even produce a complete graphic dump by altering or replacing the routine starting at the label 'prinsc'.

The program is completely legal and will work with spoolers and printer buffers. Any printer can be used with the normal *FX5 setting. The program also takes account of the ignore character, so your *FX6 setting should be made as usual.

PrtSc works by the use of events, specifically event 4, which, when enabled, occurs 50 times every second. The installation routine at 'instal' sets the event vector to the address of your program – this idea was mentioned in the May '88 issue.

The first part of the program stores all the registers on the stack. Then it checks if the necessary keys are being pressed. (Two separate checks are made, one for COPY, then for CTRL.) If they are, then it disables the event. This is so that if CTRL-COPY is pressed again, the program doesn't try to attempt another dump within the first one. The next important action is to clear the interrupt flag, as they are disabled at the entry to an event routine. Interrupts must be enabled to allow the operating system to work, for example when printing characters.

```
HINTS AND TIPS AUGUST 88 by David Atherton
3092 words

** PRINT SCREEN FUNCTION **

Many readers may know that the IBM PC has a very useful function available
from the keyboard-by pressing a key called 'Print Screen' or often
'PrtSc', at any point, within any program, a dump of the entire screen is
sent to the printer. The facility is for a text-only dump, to provide
compatibility with all printers.

This program provides the same facility on a BBC Micro. The program listed
in Yellow Pages assembles and saves to disc a machine code program called
'PrtSc' which is then *RUN before using your program. Then, at any point
during the use of your program, pressing CTRL-P will send a text dump to
the printer, without affecting anything on screen, or in the program. It
is particularly useful for, say, dumping individual records in a database
without going through a report generator, or perhaps dumping a Mode 7
screen in a viewdata program. Note that any graphics on screen in Mode 7
are converted to their text equivalents, and in any other mode, they are
converted to spaces. You could alter the program to deal with graphics,
and indeed produce a complete graphics dump by altering or replacing the
routine starting at the label 'inita'.
```

80-column text dump using PrtSc

Then the program calls the print-out routine. When this has finished, it re-enables the event so that the routine can be used again, and restores all registers from the stack and exits.

The screen printing routine works by reading the mode number, and uses this to determine the size of the screen. Then it sends the cursor to each character location on the screen in turn, reads the character at the cursor, then sends it to the printer. Note that the program takes great care not to scroll the screen. When it reaches the last character on the bottom line of the screen, it doesn't move the cursor on to the 'next' character, as that would cause the screen to scroll up a line.

The program is configured for 80-column printers, which do not need a carriage return to move on to the next line if exactly 80 characters are placed on a line. If you have a wide printer such as the Epson FX100 or *Acorn User*'s own Sakata wide carriage printer, or if you are using condensed mode printing, then the variable 'printw' in line 90 should be changed to the appropriate width in characters.

The program should work correctly on the Electron, and on all 6502-based BBC micros. It resides at location &900 in memory, and so will be corrupted if you use the cassette system to read files in, or read data from the serial port. Owners of Masters and machines with sideways RAM might like to try to alter the program so that it can be run from sideways RAM.

£5
SCRABBLE SCORER MK II

Richard Wain of Sheffield is a keen player of Scrabble, and was interested in Bernard Emblem's Hints and Tips program that we carried some time ago, which performed Scrabble scoring. However, that program didn't work out word scores, which is the part of Scrabble scoring Richard finds most tedious, so he set out to write his own version.

The program starts by asking for up to four players' names, which are used later to prompt for the scores. After this, you should play your first round of the game, so each player has one turn. Then enter the words for the first round. The letter multiples are added after the relevant letter, while word multiples are added after the relevant word.

All the letters of the actual word should be typed in using capital letters, and the special codes below should be entered with lower case. To calculate double and triple scores, the special system has to be used as follows:

d = double word
t = triple word
l = double letter
h = triple letter
b = blank or no word

So, for example if the word 'HELLO' is used, and the word falls on a double word square, with the letter E sitting on a triple letter square, you would enter 'HEhLLOd'

If you have made more than one word in your turn, then any other words should be added to the string as it is entered. For

example, if the word GO was made at the same time as HELLO, you would enter HEhLLOdGO or, HEhLLOGOd if GO was also on the double score.

The computer calculates your score from a standard Scrabble table of values, and modifies it according to the double and triple scores noted. Each player's score is taken for the round and added to a running total. The program then asks if the game is finished, and if not, proceeds to take the score again. When the game is over the program asks whether you have any letters left. If you have, type a string containing all the letters, eg, QRUU or whatever.

The best way to use the Scrabble scorer is during an actual game. Of course careful attention will need to be paid to the seating arrangements, so that keyboard, screen and players can all be accommodated.

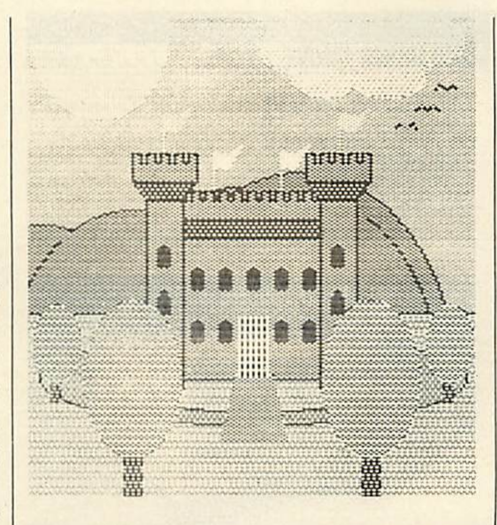
£5

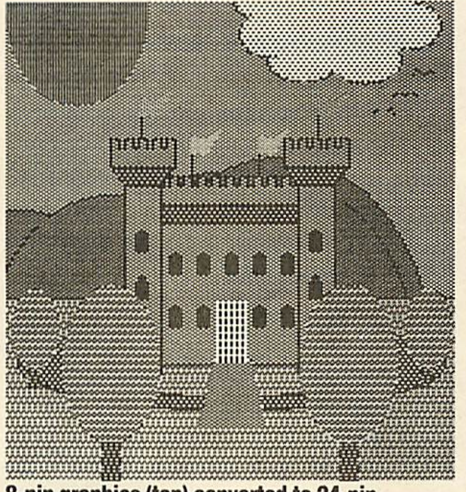
8-PIN DUMPS FROM 24-PIN PRINTERS

Martin Hesketh from Ryton, Tyne and Wear, has an NEC P2200 pinwriter, the low-cost 24-pin dot-matrix printer. Although very pleased with the quality of print available, Martin found that when using screen dumps designed for 8-pin graphics (9-pin printers don't use one of the pins when printing in graphics mode), the result was only just satisfactory, with quality worse than many 8-pin printers. This was because the printer only used every third pin when printing 8-pin graphics, leaving small but noticeable lines between each line of dots.

When Martin typed in the three 24-pin dumps in April and May's *Acorn Users*, the quality was much better. But the programs didn't give as much versatility as, for example, special printer ROMs such as Watford's *Dumpout 3*. So Martin wrote the program presented here – a converter which actually takes 8-pin graphics data and converts it to the 24-pin equivalent, using the original 24-pin graphics modes of the printer rather than the poorer 8-pin emulation provided by the printer manufacturers.

Martin's program uses the buffer insert vector (INSV) to check for 8-pin graphics. If an 8-pin graphics code is given, the program converts it to the nearest 24-pin equivalent, then converts the graphic data that follows. Now instead of printing with every third pin, each bit controls three of the 24 pins on the printer.





8-pin graphics (top) converted to 24-pin

The illustration above shows a screen picture from the Master's Welcome Disc. The top dump is without the converter. The lower one uses the converter and is much darker and sharper. The immediate reaction is that one was printed with a faint ribbon, but in fact the two dumps were done one after the other, with the same screen dump software.

The program is supplied in the form of assembler source which automatically installs itself when you CHAIN it. The correct insert vector value is calculated at the start of the program as this varies on different machines. CHAIN the program before starting up your graphics software.

DFS TO ADFS FILE TRANSFER

Following on from last month's item about 40-track and 80-track DFS discs, we turn this month to ADFS. Undoubtedly this is better than DFS in the long run, once you get used to it, but can cause a few headaches at first. Virtually all commercial software is supplied in DFS format, and to maintain compatibility with DFS users, you often find that you can't avoid transferring files between the two systems.

Copying the files is fairly straightforward. Master owners have a utility on the Welcome disc called COPYFILES and also a command, *MOVE, built into the operating system. The best method to use is to place the DFS disc in drive 0 and the ADFS disc in drive 1, and set COPYFILES up accordingly, specifying the $ directory for each. When asked for a source list specification, type a star (*) meaning 'all files'. This will copy all the files in the $ directory on the DFS disc to the $ directory on the ADFS disc, and normally this is good enough. By specifying a subdirectory on the ADFS disc (which you must have already created with CDIR) you can choose to place the files elsewhere on the ADFS disc.

A shortcoming of COPYFILES is that it only allows you to copy one DFS directory at a time. If you have several files, but only one in each directory, you might as well use the *MOVE command, which is easier to use because it is built in to the Master's Megabit ROM. But *MOVE has the disadvantage that it cannot accept 'wild cards' – that is, it cannot transfer more than one file at once.

For example, if you have a DFS disc with files !BOOT, Program, T.Data and F.Data, and you wish to transfer them all to an ADFS disc, you can place the formatted ADFS disc in drive 1, and first of all create the two necessary subdirectories:

```
*DIR :1.$
*CDIR T
*CDIR F
```

*DIR also has the effect of 'mounting' the disc. Then each file can be transferred using *MOVE without repeatedly changing directories. The sequence is shown in table 1 on the next page.

It is possible to omit any part of the syntax which is a current setting, for example if you were in DFS mode when starting to use the *MOVE command the -DISC- part could be omitted. To be on the safe side, it is best to use the full syntax at all times. Note how the filename must be specified for the ADFS part. *MOVE, unlike some other utilities, does not work with omitted filenames by assuming them to be the same.

Having transferred the files, some further alterations need to be made to the ADFS disc. First, the !BOOT option was prob-

TABLE 1. TRANSFERRING USING *MOVE

```
*MOVE -DISC-:0.$.!BOOT     -ADFS-:1.$.!BOOT
*MOVE -DISC-:0.$.Program   -ADFS-1.$.Program
*MOVE -DISC-:0.T.Data      -ADFS-1.$.T.Data
*MOVE -DISC-:0.F.Data      -ADFS-1.$.F.Data
```

TABLE 2. SETTING FILES AS LOCKED

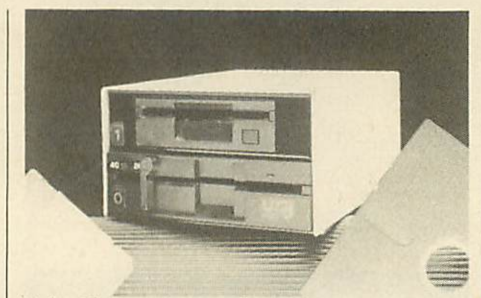
```
*ADFS (This remounts Drive 1
for safety
*OPT 4,3
*ACCESS * LWR
*ACCESS T.* LWR
*ACCESS F.* LWR
```

ably set on the DFS disc, so this needs to be set in the new disc too. More subtly, the 'L' setting listed after a filename in a DFS catalogue means it is readable, writeable, but locked. In ADFS, you have to say explicitly that the file is readable and writeable, by using *ACCESS. The operations to set all the files as readable, writeable but locked are shown in table 2. Note that separate *ACCESS commands are required for each subdirectory.

Setting up the ADFS disc in this way will help to improve DFS compatibility. The example file 'Program' would probably access one of the other files, using a command such as X=OPENIN "F.Data" or something similar. Although you cannot see the F.Data file when you catalogue the ADFS disc (while in the $ directory), this command would still find the file.

Beware of DFS filenames which use characters such as £, $, @, * and full stops other than immediately after a single character directory name, for example, FILE.TX or £.££££££. Though these characters are against the programming rules, they nevertheless work in DFS. But they won't work in ADFS and will have to be changed. COPYFILES performs the changes automatically but of course you may have to change any programs which refer to these files by their original names.

If you have only a single drive, or if you aren't using the Master, then you won't be able to use COPYFILES or the *MOVE command. Unless you have another utility program, the simplest way to transfer files is through ordinary *LOAD and *SAVE. This will, however, restrict you to copying files which will fit in memory, which for model B users is about 24k. So files must be &6000 bytes or less in length. In a model B with ADFS, the normal setting of



Twin drives make transfer easier

PAGE is &1C00. You can find what it is on your machine using PRINT PAGE.

First type *DISC followed by *OPT 1,2 – this will display file lengths. Now load the first file like this, using the address of PAGE in hexadecimal.

```
*LOAD !BOOT 1C00
```

The file details are displayed on screen, with three long numbers after the filename. From the left these are the load address, execution address and length. Remove the DFS disc, and replace it with the ADFS disc. Type *ADFS followed by *MOUNT 0 to mount the disc, and the file as follows:

```
*SAVE !BOOT 1C00 +11 FFFFFFFF 00000000
```

The order of the four numbers is the value of PAGE, plus the length of the file, then the execution and load addresses. Note that when you see six Fs after loading you should use eight Fs when saving. This is because ADFS stores file addresses to greater precision than DFS. Now replace the DFS disc and repeat for each file.

You can repeatedly catalogue the DFS disc, or you might like to make a list of all the files first. The procedures for setting up subdirectories (before the copying) and the *OPT 4,3 and *ACCESS (after the copying) remain the same. The example 'T.Data' file would be copied in the normal way with *LOAD T. Data and *SAVE T. Data.

By following the methods above, you should be able to transfer the majority of unprotected software across to ADFS. For simplicity, we have assumed that there are no 40/80-track complications, but even if there are, judicious switching of the drive at the appropriate point should make everything work. Note that protected DFS discs will not normally transfer to ADFS – for these your only recourse, short of a lot of hacking, is to ask the publisher if an ADFS version is available.

£10

MATHEMATICAL DIVERSIONS

Another program from Martin Hesketh shows how the humble BBC micro is both fast and capacious when it comes to performing mathematics. For this Martin has ignored the arithmetic facilities provided by Basic, and resorted to direct machine code programming, providing his own multi-precision integer routines.

The program runs through that mathematical series popular with computer scientists, the powers of 2. The demonstration is staggeringly impressive, showing the size of numbers the computer can handle when freed from the rather limiting four-byte integer system provided by Basic. Normally, the computer will give a 'Too big' error message at any number of more than about 37 digits (floating point) or 10 digits (integer).

This program calculates successive powers of 2, and can continue until the number of digits in the result exceeds the memory limit set, in this case about 24,500!

When you run the program, you will at first be greeted by a blank display. To increase processing speed, the output to screen is only enabled when you press the space bar. Try pressing the space bar after about 10 seconds – already the program will be past 2 to the power of 1000 – a number far exceeding the number of atoms in the universe. But switching on the display will slow calculations down considerably. Of course, as the program progresses into the realms of higher powers, the time taken to calculate each power increases.

As an experiment, Martin left his maths program running overnight, and by the next morning, he found that it had reached 277243. The 23,253-digit number took up four and a half sheets of printer paper!

Your Hints and Tips for BBC micros and Electrons are always welcome. Send them to David Atherton at Acorn User, *20-26 Brunswick Place, London N1 6DJ. Please wherever possible include a disc (which will be returned) containing both the program and text of your submission.*

PRINTER COMPATIBILITY TABLE

Codes	Effects	Epson FX80	Epson LQ800	Epson GQ3500 (LQ mode)	Citizen HQP-40	NEC P2200	Panasonic KX-P1540	Toshiba P321SL (IBM mode)
8	Backspace	■	■	■	■	■	■	■
12	Form feed (new page)	■	■	■	■	■	■	■
13	Carriage Return	■	■	■	■	■	■	■
14	Double width (temp)	■	■	■	■	■	■	■
15	Condensed	■	■		■	■	■	■
18	Cancel condensed	■	■		■	■	■	■
20	Cancel double width	■	■	■	■	■	■	■
27,33,n	Program pitch/effect	■	■	■	■	■	■	
27,38	Define downloadable characters	■	■	■	■	■	■	■
27,45,1	Underline	■	■	■	■	■	■	■
27,45,0	Cancel underline	■	■	■	■	■	■	■
27,48	1/8-inch line spacing	■	■	■	■	■	■	■
27,49	7/72-inch line spacing	■			■			■ (7/70)
27,50	1/6-inch line spacing	■	■	■	■	■	■	■
27,51,n	n/216-inch spacing*	■ (216)	■ (180)	■ (180)	■ (180)	■ (180)	■ (180)	
27,52	Italics	■	■	■	■	■	■	27,18
27,53	Cancel italics	■	■	■	■	■	■	27,20
27,64	Reset printer	■	■	■	■	■	■	■
27,69	Emphasised (bold)	■	■	■	■	■	■	■
27,70	Cancel emphasised	■	■	■	■	■	■	■
27,71	Double-strike (bold)	■	■	■	■	■	■	■
27,72	Cancel double-strike	■	■	■	■	■	■	■
27,74,n	Fractional line feed	■ (216)	■ (180)	■ (180)	■ (180)	■ (180)	■ (180)	■ (216)
27,77	Elite font	■	■	■	■	■	■	
27,80	Pica font	■	■	■	■	■	■	
27,82,3	English character set	■	■	■	■	■	■	
27,82,0	US character set	■	■	■	■	■	■	
27,83,0	Superscript	■	■	■	■	■	■	■
27,84	Cancel superscript	■	■	■	■	■	■	■
27,83,1	Subscript	■	■	■	■	■	■	■
27,84	Cancel subscript	■	■	■	■	■	■	■
27,87,1	Double width (perm)	■	■	■	■	■	■	■
27,87,0	Cancel double width	■	■	■	■	■	■	■
27,106,n	Fractional reverse feed	■ (216)			■ (180)	■ (180)	■ (/180)	■
27,112,1	Proportional spacing	■	■	■	■	■	■	27,80,0
27,112,0	Cancel proportional spacing	■	■	■	■	■	■	27,80,1
27,119,1	Double height							27,118,1
27,119,0	Cancel double height							27,118,0
27,120,1	NLQ		■		■	■	■	
27,120,0	Cancel NLQ		■		■	■	■	
27,65,n	n/72-inch line spacing	■ (72)	■ (60)	■ (60)	■ (60)	■ (60)	■ (60)	
27,75	Normal density graphics	■	■		■	■	■	■
27,76	Dual density graphics	■	■		■	■	■	■
27,89	Double density graphics	■	■		■	■	■	■
27,90	Quad density graphics	■	■		■	■	■	■
27,42,5	Proportional graphics	■						
27,42,32-40	24-pin graphics		■		■	■	■	

* Line feed commands show units in brackets

OFFERS

TELETEXT RECEIVER

We are so impressed by the exceptional quality of the new BBC teletext adapter that we have negotiated a special low-price introductory offer exclusive to *Acorn User* readers.

All orders received by July 31 1988 will be supplied at £134 including VAT and delivery (normal retail price £149). The BBC teletext adapter is available at this special price only through *Acorn User*.

The Advanced Teletext Receiver from General Information Systems was developed with the co-operation of the BBC. It is the next generation of teletext receivers for the BBC microcomputer series and is the only BBC-approved teletext adapter design.

The adapter incorporates many of the advances made possible by recent developments in teletext chip technology all packed into a ruggedly built, compact box, which can be either wall-mounted or left free-standing.

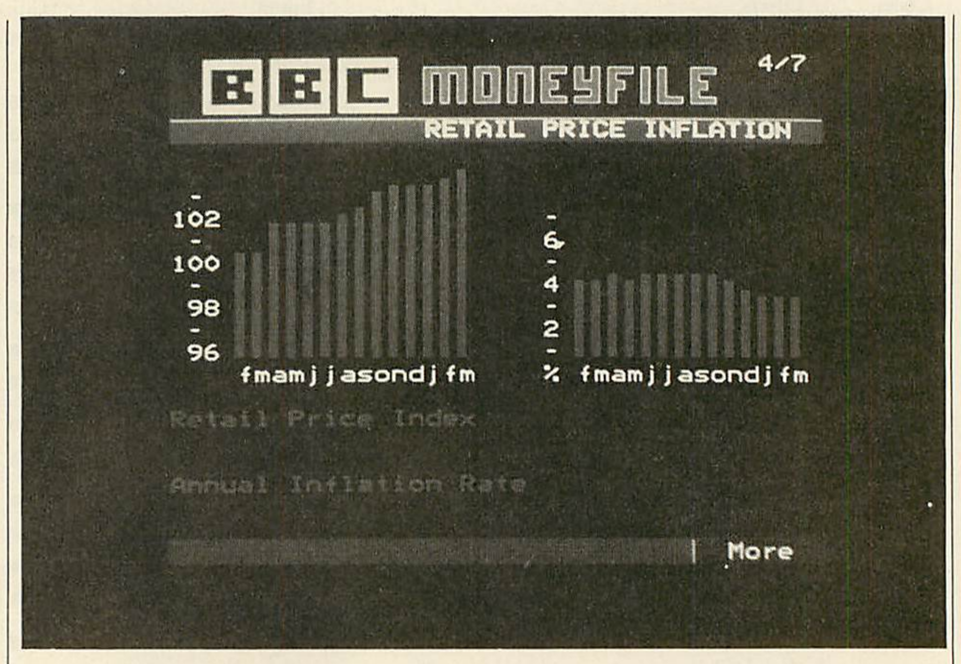
Other key features include:

- Complete access to Ceefax, Oracle and free downloadable software.
- Connection to the user port of the BBC models B, B+ and the Master 128.
- Powered by the micro's 5v output.
- The only receiver with *ATS Plus* ROM and on-board dedicated microprocessor for superior performance. The ROM is supplied with a function key strip and excellent user guide.
- The software supplied with the receiver is guaranteed to operate with BBC transmissions.
- Tuning of the receiver is achieved using simple star commands.
- If you are using teletext for a period of time the terminal has the ability to keep pages for you, updating them when new data becomes available.
- Designed for the future: the receiver offers upwards compatibility to full page teletext and picture quality teletext.

The BBC is committed to developing its telesoftware and has already made a large amount of public domain software available to its users.

You can also use the receiver's *ATS Plus* ROM commands in your own programs to extract data from the teletext pages to build a personal database of information. So you could keep track of the fortunes of your favourite football team, for example, or automatically check up on the state of your share portfolio – you could even build a system that monitored the market, and then warned you of changes.

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ADDRESS ______________________

____

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SIGNED ______________________ DATE ______________________

Please send this coupon with your remittance to **Teletext Offer, *Acorn User* Merchandising, 20-26 Brunswick Place, London N1 6DJ.**

A CLOSER LOOK

The BBC-approved GIS Teletext Receiver is bristling with features

The BBC has joined forces with General Information Systems, creators of the Red Box home security system, to launch the BBC Advanced Teletext Receiver.

The adapter gives you access to the information on Ceefax and Oracle and lets you download free telesoftware.

A single metre-long thick lead connects to the user port on the BBC micro or Master 128. Master Compact owners with an add-on user port will now be able to add teletext for the first time.

The adapter takes its power from the micro's 5v output. In addition, you are supplied with an *ATS Plus* ROM to install in one of the sideways ROM sockets or a ROM cartridge or expansion board. This is a new version of the *Advanced Teletext System* ROM released by the BBC two years ago.

Tuning is achieved by typing in *TELETEXT and then pressing Shift-f0. The screen displays a station tuning page, and gives simple instructions for tuning. First you have to press 'S' to start scanning through the channel wavelengths, and when a signal is located the scan is halted. This allows you to either save the station by pressing K, or S to continue scanning. A strong signal is indicated by the status report showing 'On-tune' and a good steady screen display. In some areas channels are transmitted on several wavelengths, and so you should scan through the entire selection before choosing one.

Individual teletext pages are called by simply pressing their unique three-figure number. The software also allows you to make use of the linked-pages system. At the bottom of the screen there are usually a series of coloured boxes followed by either page numbers or coloured keywords. These correspond to the four coloured blocks on the keystrip (f1 to f4). This linked-pages system certainly makes selecting any desired page much easier.

The 'kept page' feature is a really useful asset. If you are using teletext for long periods of time the terminal has the ability to keep pages for you, updating them when it can. This means that when you re-select them they appear immediately, without having to wait for them to come round.



Probably the best feature of the *ATS Plus* ROM is the way the telesoftware is handled. The Ceefax service has several pages dedicated to computer software. These are updated weekly. By pressing f5 a complete list of all the telesoftware available for the week is displayed. From this catalogue programs and files can be downloaded and saved to disc with tremendous ease. There is none of the confusion that the original TFS caused when in the telesoft mode, with its black screen and Searching message.

Since its release, the *ATS* ROM has been well supported by the BBC. For instance, the BBC has broadcast a program which allows a whole week's telesoftware to be downloaded off-air automatically. Other packages include programs that can collect the major news stories and then print them out in newspaper format. These programs will all work with the *ATS Plus* ROM too. In addition BBC Schools Broadcasting has started to use the telesoftware service for sending out details of its broadcasts.

The most exciting development is the use of *ATS* ROM commands so that your own programs can extract data from teletext pages. One example of this is a program that allows your computer to look at the weather pages on Ceefax every day, take the data and plot graphs. This allows a database of weather information from all parts of the country to be built up. In the same way, checks can be made on how your favourite football team is doing. Financial information on Ceefax also allows an automatic check on the state of your share portfolio — and you could even build a system that monitored the market, then warned you of changes.

The ROM comes with a function key strip and an excellent user guide.

There is no doubt the new Advanced Teletext Receiver is an impressive performer. One reason for the BBC's adoption of the GIS adapter is that the BBC regards its Ceefax service, and especially the telesoftware service, as an important part of an integrated system.

Perhaps the most important aspect of the adapter is that it is BBC endorsed, and so everything that is broadcast will work. If you want access to Ceefax and Oracle this is a great way to receive it.

ARC AGORA

MODULE MANIPULATION

In this month's Agora: how to handle the Arc's relocatable modules, and a sample module for compacting screen images

Dave Acton

Most of the software built into the Archimedes comes in the form of 'relocatable modules' – that is, pieces of Arm code that behave in a very similar way to the sideways ROM of the BBC and Master computers.

The main difference between an Arc module and a Beeb ROM is that whereas all Beeb chips are loaded at 'apparently' the same address and live side-by-side, Arc modules are relocatable – they may be loaded wherever there is a suitably large space for them, and they can all be active at the same time.

Several helpful *commands are built in. To list all currently active modules, type *MODULES. *RMLOAD simply loads a module into the RMA (Relocatable Module Area) – an area of memory set aside for modules. You may configure the RMA size using *CONFIGURE RMASIZE although the value you specify is not taken as an absolute maximum, merely as a sort of 'contingency memory fund'. If you load a module which requires more space, the RMA will usually be enlarged accordingly.

*RMRUN loads and 'starts up' a module if it is an application rather than just a 'service' module. *RMKILL removes a module from the RMA space and *UNPLUG is harsher still – killing the module and setting a bit in the battery-backed RAM so that the module will not even return after switching off and on. *RMREINIT will reinstate a module and will also reset the 'unplug' bit if necessary. Note that *UNPLUG, when typed with no parameter, lists all unplugged modules.

As Richard Charles from Ulster found, you can safely *UNPLUG all but the first four modules, releasing about 280k extra to use with the PC Emulator. If you want to unplug modules, but also wish to preserve your current configuration, then why not save it with P J Dellar's utility from last month's Agora? Our main program this month – listing 1 on the yellow pages – is a sample module called 'ScreenUtils'. It contains two invaluable routines to compact and expand screen images. Since Arc screens are up to 160k in size, there's a considerable need to compact them in some way.

Because module code must be relocatable, OPT values of 4 and above must be used so that the code is placed at O% but is assembled to run at P%. Initially, we set O% to code% and P% to 0, so our module is assembled to run at address 0 which means that any internal references will work out correctly. The first seven memory words of a module are standard to all modules.

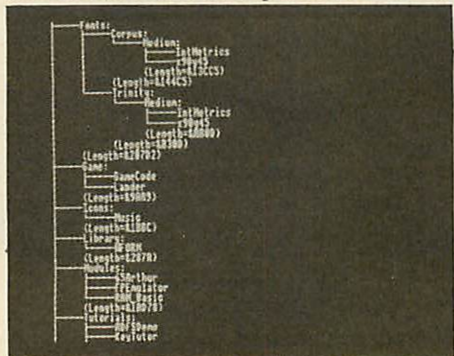


Figure 1. Files displayed with FNtree

&00 contains a pointer to the 'start code' – the address to call if the module is selected as the current application. ScreenUtils is a service module so this word contains zero. &04 points to the 'initialisation code', which is called by *RMRUN, *RMLOAD, *RMREINIT and *RMTIDY. The code for ScreenUtils starts at '.init' and simply claims one page of workspace by invoking SWI "OS_Module" with R0=6. R3 contains the amount of space required and the address of the space allocated is returned in R2. This value is stored in the 'private word' contained in R12. Thereafter, any calls to ScreenUtils will be made with R12 pointing to its private page of memory. &08 contains the address of the 'finalisation code' – called by *RMKILL and *UNPLUG. ScreenUtils has no finalisation code, but this could be used to prevent its removal from the RMA. &0C contains the address of the 'service call handler'.

Service calls are passed to modules in much the same way as they are passed to BBC ROMs. Unknown *commands and requests for help are dealt with separately under the module system though, so ScreenUtils requires no service call handling. &10 contains the address of the module's title string, as displayed in *MODULES for example. The string must be zero-terminated and must be followed by ALIGN to ensure subsequent instructions start on word boundaries. ScreenUtils uses the macro FNequz to include a zero-terminated string. Note that the FN need not be preceded by an OPT in Basic V: the value returned by FNequz is simply thrown away. 0&14 contains a pointer to the module help string. This is also zero-terminated and contains a tab character (ASCII 9) so that the name lines up neatly with those of the other modules. &18 is the last essential header word and contains a pointer to a table of all the *commands.

If our module contained its own SWI calls, the next four words would also contain special information, but if these words do not contain sensible values they are ignored by the operating system.

The command table consists of a list of *commands, terminated by a zero byte. The macro FNcom is used to assemble each command and takes as parameters:

- the command name
- a pointer to the command's code
- some flags
- a pointer to a 'syntax' string
- a pointer to a 'help' string

The flags contain information about the minimum and maximum permissible number of parameters and if these limits are breached, the syntax string is used as an error message.





Figure 2. Above, *Zarch* screen and demonstration image have been compacted



Figure 3. Colour-filled maze

Space does not permit a full description of how the screen compaction works, but here's a brief outline. The screen mode and palette information are written to the file. The screen is scanned 16 times and each time recurring bytes are looked for. The file is made up of pairs of values – the byte from the screen and the number of times it occurs in succession. This process is often called 'run-length encoding'.

The best scan is found and is used to compact the screen. Each scan uses a different number of bits to store the count. A screen with large colour blocks is best compacted using a lot of bits to store each count, whereas a more detailed screen will be most efficiently stored using fewer bits.

The process of saving the screen takes a few seconds and is proportional to the size of the screen. The size and memory address of the start of the screen memory are read 'legally' using the SWIs 'OS_ReadVduVariables' and 'OS_Read_Mode Variable'.

Listing 1 saves the assembled code as ScrUtils and sets the file type or &FFA. Listing 2 is a short demonstration of ScreenUtils. The module to 'module' is loaded, a colourful pattern is drawn and some text is displayed in the middle. Then the screen is saved in full using *SCREENSAVE and compacted using *SAVEPIC. The compacted screen is reloaded and the percentage reduction in size is calculated using SWI 'OS_File' to read the lengths of both the compacted and uncompacted versions of the pictures.

*SAVEPIC can be used in any screen mode and *LOADPIC changes the mode accordingly. A typical *Zarch* screen compacts to about 10 per cent, which saves about 70k of valuable disc space!

£5

A SHORT UTILITREE

The Arc's *COUNT command can be used to display the files on a disc, but for a more graphical and readable version why not try J F Button's program – listing 3 on the yellow pages? It also illustrates many useful features of BBC Basic V.

The program requests a directory name and then FNtree is invoked to display the files found (figure 1). It works with ADFS, ANFS and any other filing system.

To draw the tree, several characters are defined in PROCinit. Note that if 'Country' is configured to Compact then these characters will already have been defined. A check is also made to see if the program is being run in mode 7 and, if so, alternative characters are used to draw the tree. The keyword MODE when used as a variable returns the current screen mode.

The filenames are read conveniently using OS_Gbpb and the file lengths are extracted using OS_Files. Mr Button makes extensive use of the IF...ELSE...ENDIF structure to keep his program neat and employs WHILE...ENDWHILE when indenting filenames. This is very useful when you want a loop to repeat exactly zero times.

£5

ARE YOU FILLING ALRIGHT?

Because the Archimedes is well behaved in the way it handles events and interrupts, it's possible to do all sorts of things 'behind the computer's backplane'. Listing 4 on the yellow pages comes from *Acorn User* regular Dave Lawrence and illustrates one possibility.

A diagonal maze is drawn on the screen using two characters defined at the start of the program. This maze is then flood-filled. However, the event vector (number &10) is intercepted using the SWI call OS_Claim and the routine .gcol is added to the chain of event-handling routines.

The vertical sync event is enabled with *FX 14,4 prior to the flood fill (and disabled afterwards with *FX 13,4), so '.gcol' is called 50 times a second while the maze is being filled. The short piece of code selects each colour from 0 to 63 in turn by performing the equivalent of VDU 18,0,colour with three SWIs. OS_Claim takes three parameters – a vector number, the address of the new code to add to the chain and a value to be passed in register R12. In the example, this last value sets how frequently the plotting colour is changed (in fiftieth of a second units).

All submissions should be sent to Arc Agora, Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

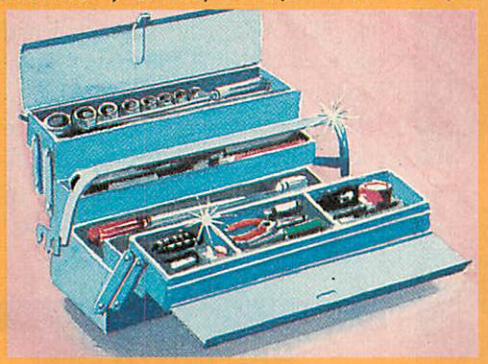


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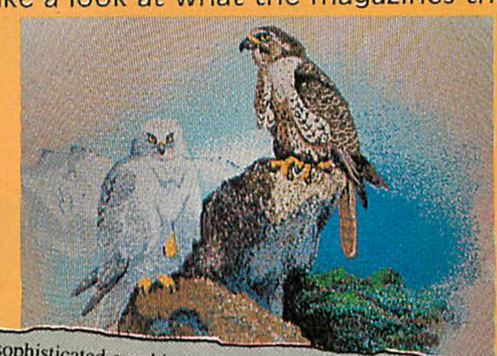
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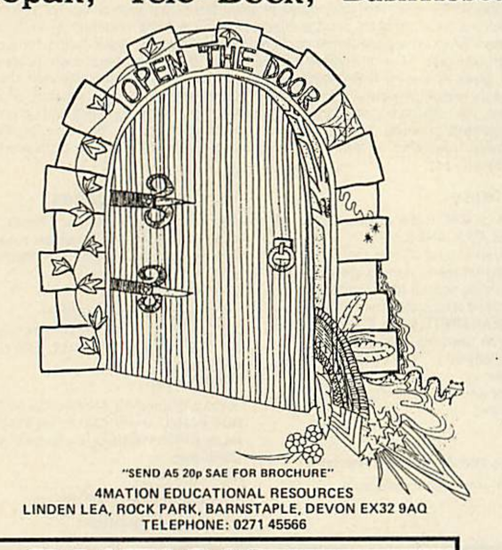
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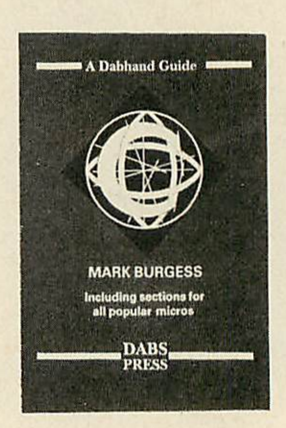
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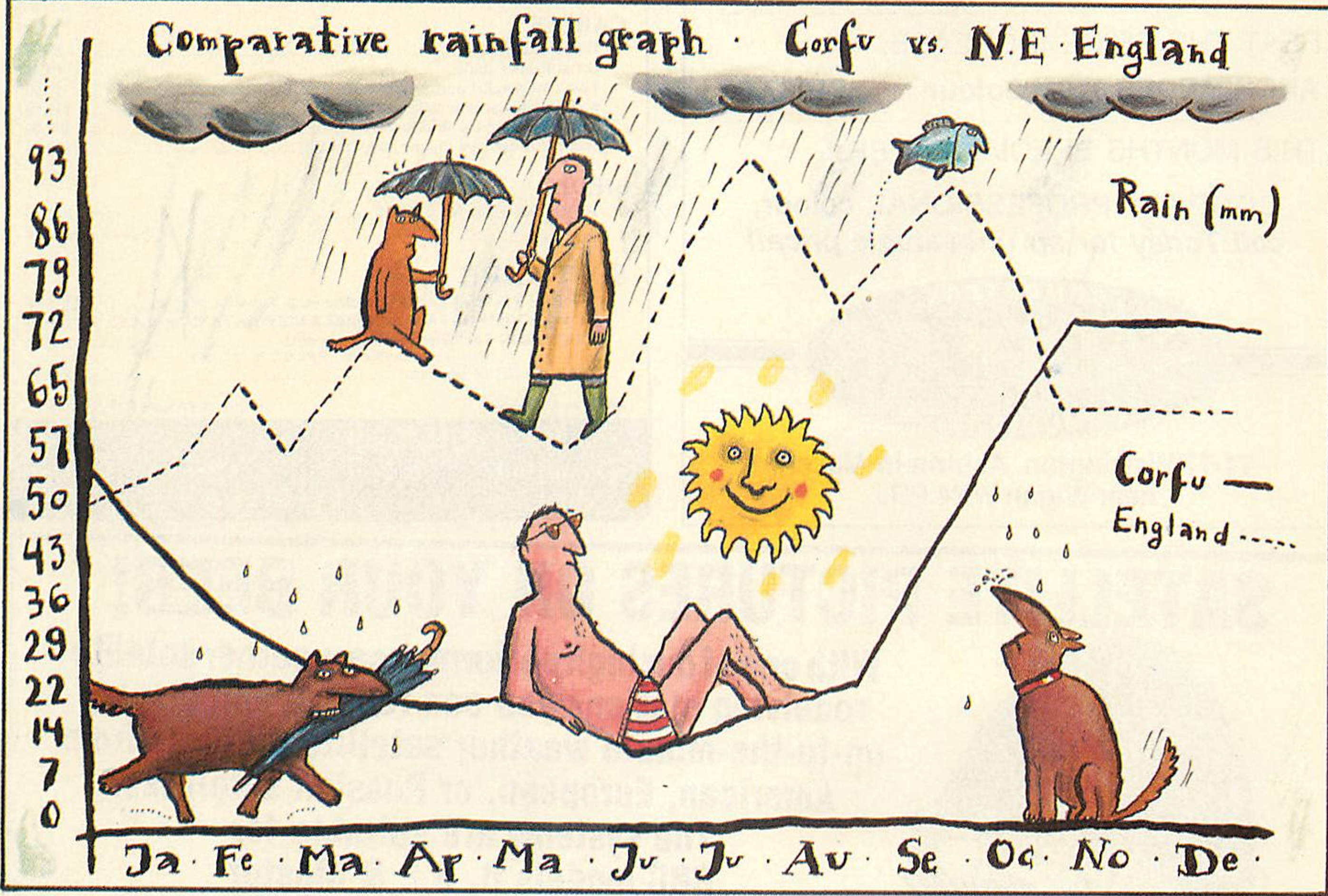
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GET PLOTTED



Plotting graphs can be a tedious exercise – especially if you have to draw them by hand. Let your micro do the hard work

Joe Telford

'It worked all right yesterday,' said my wife, peering at our flexible friend. I passed around a wad of papers containing lists of figures provided by last month's Jottings spreadsheet. 'But Daddy,' breathed my darling daughter, 'I don't understand these figures. I can't see how such little numbers could make you so worried.' Thus went a recent meeting of the Telford Financial Committee. But it might not be your family fortunes that mean you want to use a spreadsheet; it could be the need to assess home heating efficiency, or the conversion rate for drachmas for the Greek holiday. You might want to compare the temperature and rainfall of Corfu with that of Consett, and in all these items the common thread is interpretation.

Graphs are unlike raw numbers; they are understandable. Their shape indicates far more than the figures themselves do.

It's a back-breaking task to draw graphs, because it is mechanical. The human element is the interpretation of the graph, and because of this the less time you spend drawing it the better. This is an obvious application and quite straightforward for the computer to take on board.

Rather than design a graphics package which would draw graphs all alone, I felt the spreadsheet developed in the July issue of *Acorn User* could contain the data to be graphed. So an add-on graphing package could be developed into the same user interface and data structures. The key criteria were:

- To be simple to use
- To integrate and be fully compatible with the original spreadsheet

ILLUSTRATION BY AXEL SCHEFFLER

- To contain full prompts for all actions
- To embody the key elements of all graphics packages.

I decided as much information as possible should be converted directly from any previously designed spreadsheet, so the only typed input would have to be the title of the graph.

How it works

As with last month's spreadsheet, this package is designed on the 'see-do-inform' principle – once an action has been initiated, messages keep you informed on how to progress next. All the initial commands are accessed through the red function keys, sometimes in association with the Shift or CTRL keys. As with the spreadsheet, this program does not have a 'command mode' – such modes are confusing in the early stages of learning.

Messages explain what the system is doing at any point and any problems that occur should pop-up in the message space at the top of the sheet.

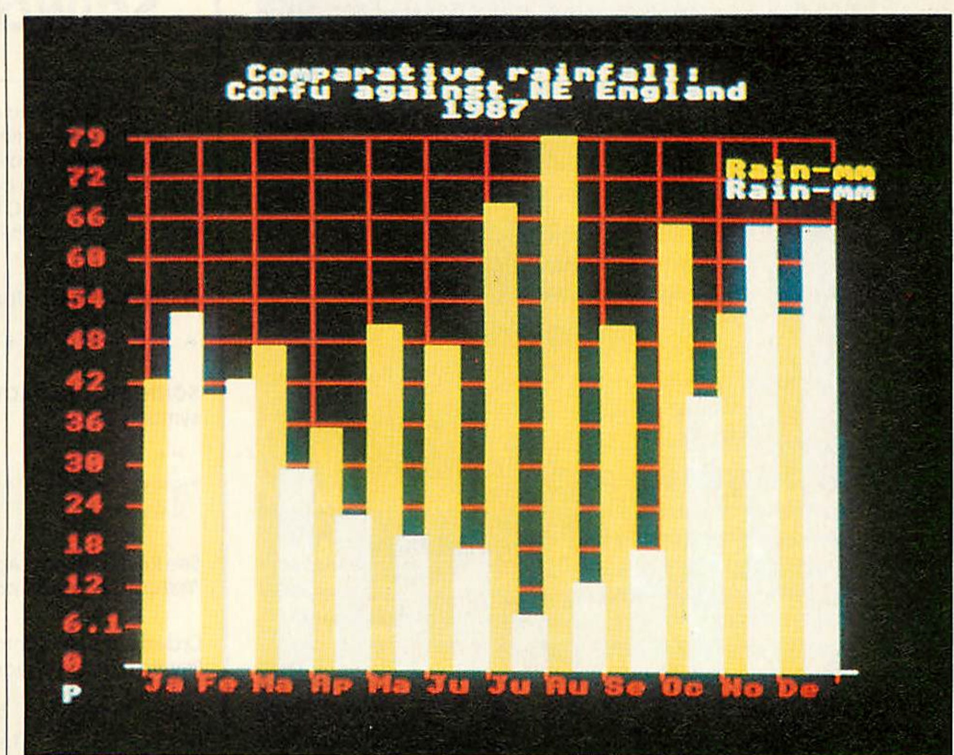
Right from the beginning, the philosophy that graphs are about interpretation and comparison requires that more than one graph should be visible. So this package has data ready for two graphs which can appear on screen either separately or together. In addition there is a range of graph types, some of which are more applicable to certain types of data than others. The program on the yellow pages has pie charts, bar graphs and line graphs in its repertoire.

Like last month's spreadsheet, the main filing tasks are cataloguing a disc, loading and saving files, plus deleting files. These tasks should be self-explanatory once invoked. In addition, the spreadsheet should work on any currently selected filing system. With ADFS or NFS, directories S and N need to be created.

It is important to be able to print out a hard copy of the graphs which the package generates, so an Epson-compatible four-tone screen dump is included in the program. However, you can easily replace this with a star-command if you have a screen dump ROM, or with your own favourite mode 1 screen dump.

With any graphing package, it is essential to classify and scale the data in some way. This is performed by automatic scaling of the numerical axis – the program searches for the highest values among the data and plots the axes accordingly.

The two graphs must be clearly separated using different colours, and a 'key' function allows each axis to be labelled from the contents of the appropriate spreadsheet slot. The title can be added to the finished graph by a simple three-line input via a 'title' function key.



You don't have to enter any new data to produce graphs – this bar chart was drawn from information stored in Joe's spreadsheet

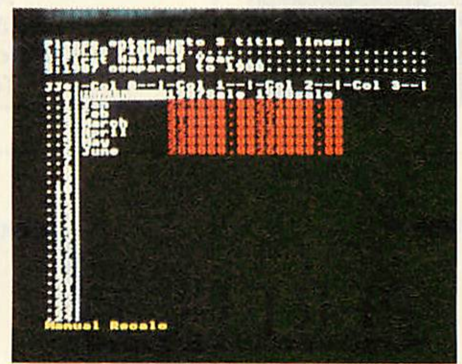


Figure 1. Data loaded from the spreadsheet. . .

. . .is plotted as a bar chart

Using the graphics package

Because the program is so large, you must be very careful typing it into memory. Once the program is entered, save it onto the same disc as the spreadsheet from last month's *Acorn User*. You might use the filename GRAPH. Do this first so that your work isn't accidentally lost.

This will still allow you to save about 14 spreadsheets on DFS, 47 on ADFS or hundreds with NFS.

On a hierarchical filing system like ADFS or NFS, you need two extra directories, S and N. S is for files holding the text and formulae for the spreadsheet, while N is for files which hold the actual numbers. When you have these set up, the next stage is to build an autoboot file as follows:

```
*OPT4,3
*BUILD !BOOT
0001 *KEY 0 MODE 129:
CHAIN "SPREAD"|M
0002 *KEY 1 MODE 123:
CHAIN "GRAPH"|M
0003 CLS:PRINT'"f0 =
Spreadsheet"'"f1 = Graph
package"
ESCAPE
```

Now whenever you press Shift-Break the prompt on screen allows you to start the appropriate program.

There are a number of functions available for us to use in the graphics package. Some, like the cursor keys, filing, restart and exit keys are identical to the spreadsheet, while others, like the Print key, have extended functions. All the functions share the same physical location as those on the function key overlay strip. Those unique to the graphics package are all accessed through a combination of holding down CTRL plus a

function key. The complete overlay, which can be used for both packages, is shown on page 61.

The cursor keys allow movement around the sheet, and are crucial to the mechanism for selecting graphical data. Using CTRL with the cursor keys causes the cell cursor to jump quickly to the left and right edges of the sheet or to the top and bottom. The Shift key in conjunction with the cursor keys move the cell cursor four slots at a time. Remember that the package is written in Basic so functions like redrawing the screen take a little time.

Filing

All the red keys which affect filing are shared with the spreadsheet and work in exactly the same way. Pressing f4 at any time catalogues the current disc, concentrating on the S directory. Anything in here should be a loadable spreadsheet file. The Space bar brings you back to the spreadsheet program. Key f5 allows you to save the spreadsheet. When pressed, a message asks you for the filename. Simply type a filename of up to seven letters and press Return. After a while the files will be saved. If a problem arises, such as a full disc or catalogue, or if a file already exists with the same name, you will be informed and can take appropriate action – by deleting the file for example.

With all these filing functions, simply pressing Return instead of a filename will show a catalogue of the disc. Press Space then type in a filename.

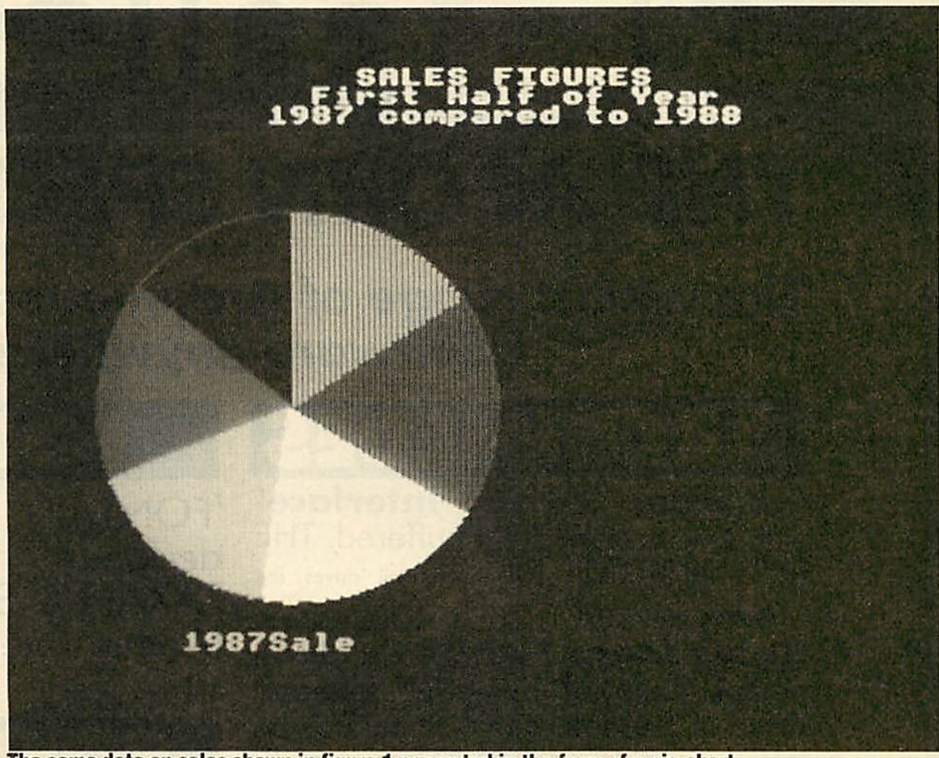
Like the spreadsheet, you can delete all the data by restarting the whole package. To do this, press Shift-f9 and answer the message with Y. The program will restart after a while. Pressing f9 by itself issues a 'Do you really want to end?' message. Press Y at this point will bring you back to Basic. These keys are shared with the spreadsheet.

Using the graphing functions

The first thing to do is to load the spreadsheet from which the graph(s) will be drawn. Let's assume it looks like figure 1.

The next stage is to decide which graphs you require. Let's assume you need a comparison of sales in the first halves of 1987 and 1988. You can start by pressing CTRL-f0, the 'title' key. You then have three lines in which to write this title – and you could enter the information as:

Sales Figures
First Half Year
1987 compared to 1988



The same data on sales shown in figure 1 presented in the form of a pie chart

Once done, an 'Is this OK?' message appears. Press Y to confirm or N to re-enter details. Once the details are finalised, they will appear automatically centred on the top three lines of the graph screen.

Now you need to set up the horizontal axis labels for both graphs, and here you might need to record the months as column titles. The column of months is called the 'legend', and you start this off by pressing CTRL-f1. You are prompted to move to the start of the legend, then to press Return. This is done using the cursor keys to move the cell cursor to 'Jan' on the spreadsheet display, then Return is pressed. When the message changes, and prompts you to move to the end of the legend, move down the column to 'June' and press Return. This identifies the legend as part of the column.

Now press CTRL-f3 the 'key' key. A message asks which graph this key is for. Answer with 1, then follow the next instruction to move to the slot containing the key and press Return. The slot is the one containing '1987Sale'.

Adding data

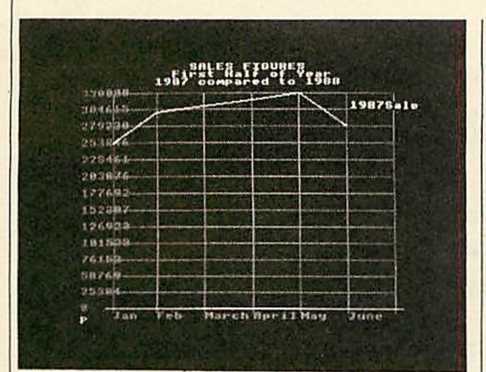
You start data collection by pressing CTRL-f2. First you are asked to tell the computer which graph you are collecting data for. You can do this by pressing the number key 1. Now you are prompted to move the cursor to the start of the data, then press Return. The data or graph 1 starts under the '1987Sale' heading opposite 'Jan', and we move to this point. After pressing Return, the message then asks you to move to the end of the data for graph 1 and to press Return. In this case, you should move the cursor down the column to the figure opposite 'June' and press Return. This identifies the six data values for graph 1.

To select the second set of data press CTRL-f3. A message asks which graph this key is for. Answer with 2, then follow the next instruction to move to the slot containing the key text and press Return. The slot is '1988sale'. Move there, press Return and you have set the key for graph 2. Then press CTRL-f2 again, and once more you are asked to tell the computer what graph you are collecting data for. Answer with the number 2. Now you are told to move to the start of the data, then press Return. The data for graph 2 starts under the '1988sale' heading opposite 'Jan', so move to this point and press Return. Then fix the end of the data by moving the cursor down to the figure opposite 'June', as before, and pressing Return.

Selecting and printing the graph

Now comes the easy part. Simply choose the graph representation you wish to use, and press the function keys accordingly: CTRL-f4 for a pie chart, CTRL-f5 for a bar chart, or CTRL-f6 for a line graph.

Once the option is selected, the prompt asks whether you want to draw graph 1 or 2, or both. Press 1, 2 or B. Note, though, that the 'B' must be a capital letter. Then the



The same data again, as a line graph

appropriate graph is drawn, complete with keys, legend and title.

Note that the pie chart option does not use a legend, although it is useful to know that the pie chart is drawn anticlockwise from 12 o' clock, so that the sectors could be identified if necessary. Any pie chart can have up to 20 sectors before the colour patterns start to repeat.

Of course, you need to print out graphs, and the simplest way to do this is by using a screen dumping procedure. The letter P flashes in the bottom left-hand corner of the screen whenever the facility to print the screen contents is available. Make sure that an Epson-compatible printer is available, properly connected and set at the top of the page, then press the Print key on the function key overlay. This is f8, and is one of the keys shared by the spreadsheet and the graphics package. Notice that in the spreadsheet this key gives a print-out of the whole sheet in columns and rows, or in terms of cell contents, but cannot print any screen graphics. In the graphics package, the key only functions when a graph plus a flashing P is on screen. It will only dump the current screen to printer.

Once Print has been pressed, the printer should stutter briefly (if it doesn't it might not be on-line) and the flashing P will become a steady * to indicate printing is in progress. I decided to include this facility because the Basic routine for dumping is very slow. It should run faster on an Arc.

Eventually the screen will be dumped, and the explanation key (if used) will match the colours on both graphs, so they can be separated. Note, however, that the final print-out is tone-reversed: white and black are reversed on the hard copy, while the red graph axes are very light indeed. Once the print-out is performed, the flashing P reappears, and a further print-out of the same graph can be done. Or you can return to the spreadsheet to set up another graph. To do this simply press the space bar. Do not press Escape!

One possible alteration to the program would be to have to three graphs available instead of two, and to use red for the third graph, with yellow for the axes. I'm sure that you expert users can deliver the goodies yourselves. A little hint is to search for arrays that are dimensioned as arrayname (2), and arrange for element (0) to contain info about the third graph!

Remember I suggested in the last issue that the spreadsheet can be considered to be a long roll of paper which you can pull through a viewing area (the screen) in windows of four columns by 25 rows? This program actually extends this idea by adding two extra areas, one on the left of the sheet and one on the right, which have no rows or columns. These are available as graphing areas.

Knowing where these areas are is useful, if for example the automatic exit from the graph page doesn't take place (eg, because you hit Escape during a print-out). You can recover the spreadsheet simply by using Shift right, then Shift left, or in some cases Shift left, then Shift right.

Complex graphing

It is just possible to display two graphs from different sheets, for example in the situation where monthly figures for a year are on two different graphs. The process is as follows:

- Load first sheet
- Select key slot for graph 1
- Select data for graph 1
- Select legend for both graphs
- Load second sheet
- Select key slot for graph 2
- Select data for graph 2 (NB, matching row, column and number of items)
- Add title
- Graph both

Combining the programs

If you've got enough memory, the whole package including the spreadsheet program could be combined to run in one unit. It is important to realise that both programs make large memory demands because of the array of structures used. Anyone considering combining the programs should consider shortening the variable names, altering the main spreadsheet data-structure and using either BAS128 on a Master or a co-processor with HiBasic.

So now we've got *Lotus 1-2-3*.

For the one or two readers who have asked me why I haven't yet produced *Hypercard* on the BBC Master. I fully intend to get down to it as soon as possible.

ACORN USER SPREADSHEET AND GRAPHICS PACKAGE	DETAILS FOR GRAPH				DRAW GRAPH						
CTRL	TITLE	LEGEND	DATA	KEY	PIE	BAR	LINE			NEW SHEET	GRAPH SHEET
SHIFT	RECALC AUTO MANUAL	RECALC FORCE		INSERT COLUMN	INSERT ROW	DELETE COLUMN	DELETE ROW	SLOT			
fKEY	ENTER TEXT	ENTER NUMBER	ENTER FORMULA	REPLICATE	FILING CAT	FILING SAVE		DELETE	PRINT	EXIT	SHEET

MEGA BYTES FOR MINI BUCKS

NEW LOWER PRICES

Picture shows 20 and 28 megabyte units. 40 and 56 megabyte units may be slightly taller in size.

Plug in 20 to 112 MBytes of extra storage with the Viglen Winchester System

If you want to increase your storage capacity up to an incredible 112 MBytes you need a Winchester; but not just any Winchester ... the new Viglen System is 100% compatible with the Acorn Winchester, it's simplicity itself to install and it costs a lot less than you think.

The Viglen Winchester is ready to plug straight into your BBC Master or if you have a B or B plus you will simply have to fit an ADFS ROM. You can use up to two floppy disk drives in conjunction with the unit and, fitted to the B+ or Master, the floppies can double their capacity by running in double density mode.

The 112 MBytes Viglen Winchester System is equivalent in capacity to over 1000 100K floppies or 250 400K floppy disks. It takes under 2.5 seconds to save 200K bytes, making it at least ten times faster than the equivalent floppy disk options. The system is designed for virtually every application from education or business to home use.

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VB40 40M Winchester	799.00
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Drive 1 Second Drive	
VB120 20 M Drive 1 Winchester	479.00
VB128 28M Drive 1 Winchester	499.00
VB140 40M Drive 1 Winchester	739.00
VB156 56M Drive 1 Winchester	769.00
Acorn ADFS ROM with utilities (essential for BBC B and B Plus)	29.95
Acorn 1770 upgrade kit (BBC B)	49.95

WHAT DO I GET FOR MY MONEY

1. Winchester Unit–(winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.

2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS ROM and utilities available at an extra cost).

3. Winchester user guide.

4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

COMPATIBILITY?

Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).

PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disk drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

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DRIVE 1 DATA: This is a 20 way socket which is used to connect the data signals to a second winchester drive.
DRIVE 1 CONTROL: This is a 34 way socket which is used to connect the control signals to a second winchester drive.

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VENTURE INTO TIME

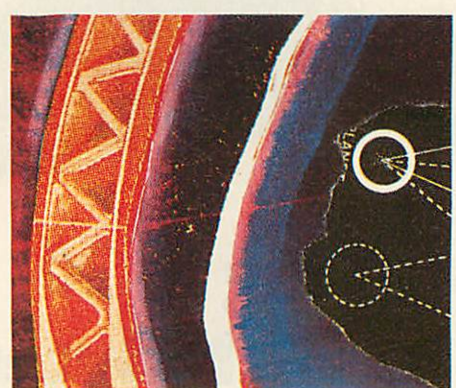
In the first of a three-part series, we look at how the adventure game has developed and bring you the exciting *Warlord* on disc

Peter Voke

The adventure game is dead – long live the adventure game! Like paper in the office, like mail that gets delivered through the letter box in the morning, like black-and-white newspaper, and even like books, the text adventure game has been declared dead. But it refuses to lie down. The prophets of the future, with their paperless offices, electronic mail, on-line news and compact-disc books, predict that we will move on to newer and better ways of doing things, forgetting that there is usually a place for the old and familiar. We still ride horses, even though we use cars or planes, because it is a relaxing and pleasurable activity.

So with the adventure game. It has given rise to offspring as varied as that famous adventure with graphics, *The Hobbit,* from Melbourne House, and purely graphical games with adventurous objectives and puzzles like Superior Software's *Citadel.* There are also the multi-user dungeons like the famous one from Essex University, and even adventure parks that have nothing to do with computers but borrow their ideas and puzzles from adventures. All these owe some debt to the original adventure by Crowther and Woods.

No-one writes or sells games like *Pac-Man* any more. The arcades are now full of games that go on and on, puzzle beyond puzzle, scene after scene. People like variety, something new opening up as each problem is solved, doors opening into secret gardens. In short, even in the arcade-type games that are nothing but graphics and movement, timing and skill, people want adventure. Think what *Frak!* or *Repton* would be without the element of exploration. In 1988, adventure is every-



where. Yet with all the excitement of the arcade adventures, multi-user dungeons or adventure parks, the original text adventure still has a very special place. Neither the cinema nor television is quite the same as opening the first page of an unread novel. And nothing will substitute for settling down at the computer terminal to load in the first frame of a new text adventure.

These are games that can take you backwards and forwards in time, into fairyland, or on hilarious holidays to the Costa Brava; to strange planets or haunted mansions, slaying dragons or tracking down murderers. Yet they are games that never hurry you, games you can savour and take your time over, games you can leave when you will and take up again where you left off. They are among the most relaxing computer programs ever written – the equivalent of the folk tale told around the camp fire. Perhaps one day the adventure game will find its Homer, someone who will perfect and define it for all time.

But perhaps the original *Adventure* was already near to perfection: 'The glowing rock fills the farthest reaches of the cavern with a blood-red glare, giving everything an eerie, macabre appearance. The air is filled with flickering sparks of ash and a heavy smell of brimstone. The walls are hot to the touch, and the thundering of the volcano drowns out all other sounds. Embedded in the jagged roof far overhead are myriad twisted formations composed of pure white alabaster, which scatter the murky light into sinister apparitions on the walls. The one side is a deep gorge, filled with a bizarre chaos of tortured rock which seems to have been crafted by the devil himself. An immense river of fire crashes out of the depths of the volcano, burns its way through the gorge, and plummets into a bottomless pit far off to your left. To the right, an immense geyser of blistering steam erupts continuously from a barren island in the centre of a sulphurous lake. . . '

The prose may be purple, but imagine that greeting after several dozen tricky puzzles. If you have played the original *Adventure*, you won't have to imagine – you will surely remember arriving at the volcano cavern for the first time. There is no experience quite like finally cracking a problem in an adventure, and being rewarded by entering a new and exciting location, leading on to further parts of the game. In the end, every adventure is in essence a series of locked doors to which you must find the keys.

That first adventure was written just 10 years ago in Fortran on a DEC mainframe, by Willie Crowther and Don Woods. Shortly after, Scott Adams fitted it into a 16k micro, and went on to write some of the best adventures around. Some of the games that experienced players consider landmarks in the brief 10-year history of the genre are the *Zork* series from In-

ILLUSTRATIONS BY GARY POWELL

focom, *The Hobbit* published by Melbourne House and the adventures produced for the BBC micro by Level 9 some years ago; these include a good version of the Crowther and Woods original – *Colossal Adventure.* Acornsoft brought out some small but well-known adventures when the BBC micro was young: *Philosophers' Quest, Kingdom of Hamil* and *Castle of Riddles.* Derek Haslam's *Gateway to Karos,* also published by Acornsoft, is one of the best adventures ever written specifically for the BBC micro. In spite of this, he cannot find a publisher for the sequel, *Mirror of Khoronz*, which is a great loss to adventure lovers. And there's also the huge *Acheton,* the first disc-only BBC adventure.

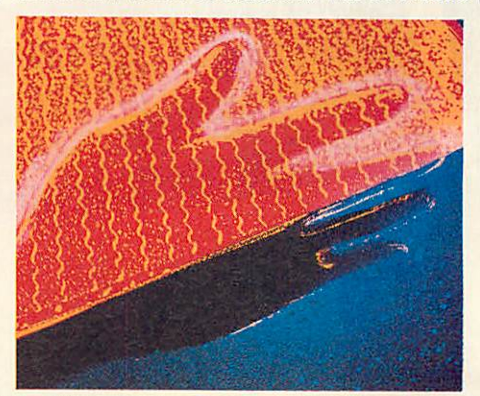
The truth is that most of the technical innovations used to 'improve' the adventure game are not essential. The program tells you where you are, and waits for you to type in some instruction, such as MOVE NORTH or TAKE GOLD, to say what you want to do next. Of course, the technical wizards have taken this simple formula and added much sophistication, such as the use of more than two words for input, complex 'parsing' programs so that the player can almost type in ordinary English, and creatures that move around in the adventure, apparently with wills of their own. But even the first adventure had axe-throwing dwarfs, the pirate and the troll, and a single long sentence is usually just a sequence of two-word commands.

Perhaps the only pleasure that compares with playing adventures is writing them. You need a good adventure generator program, since you don't want mere technicalities to inhibit your literary or puzzle-constructing flair – several have been published for the BBC micro. The February 1984 issue of *Acorn User* contained the listing of a Basic adventure by Joe Telford, which you could modify. The rest depends on imagination, a sense of humour, the gift of lateral thinking, and more than a little inspiration. You must be able to write well since there is nothing as annoying as playing an adventure full of spelling mistakes.

On this month's disc there is the first part of a massive disc-based adventure that I wrote in 1984 with Graham Williams. *The Warlord* was originally published in a different form on cassette by BBC Soft, but in its new clothes is available to *Acorn User* readers who buy both this month's and next month's listings discs.

Graham provided an ambitious script which clearly could not fit into the memory of an unexpanded model B, even using the most sophisticated modern text compression techniques. Nevertheless, the plan of the adventure was magnificent and the quirky humour was exactly pitched to appeal to adventure-lovers. The final game could be played either as two interlinked adventures on a 32k model B, or as a single seamless adventure of 54k on disc, using overlays. Before text compression, the total size of the adventure was over 100k. It had more than 200 locations, with scores of words being understood and the command entry system understanding or parsing up to four words, for instance 'place screwdriver in crucible'.

The integrated disc version of *The Warlord* has six overlays, that is, at six points in the adventure the disc drive will turn on and a new series of locations will be loaded in. The whole adventure is written in a special compressed pseudocode interpreted by a machine code program that operates at high speed: effectively, the micro is turned into an 'adventure processor' at the lowest level possible. The machine code replaces the Basic language, the pseudocode 'adventure' effectively replaces the Basic program.



On this month's disc, in directory W, is the interpreter, all the data files needed for getting the adventure up and running, and the first three of the six overlays. It would be a good idea to put all the *Warlord* files in directory W, along with the overlays, onto a fresh disc, so you have room to save your positions. You can play the first half of the adventure right away, and next month you can copy the remaining three overlays over from directory W, and continue the game to the end. You must keep the disc in the drive at all times, because of the overlays. If the disc is missing, the error message 'disc:' will appear. Put the right disc in, and press Return.

To play the game, when the arrow prompt appears simply type in anything that comes into your head. You can move north (N), south (S), east (E) or west (W), and in some locations up (U), down (D), left (L), right (R), back (B) or forwards (F), enter (EN) or exit (X). All the action words in the adventure can be shown on screen by typing HELP. Apart from the direction words, everything must be typed in full, without abbreviation.

The aim of the game is to collect certain objects that your time-travelling friend Tim Trevyl will need right at the end. Which objects? Well, that's for you to discover! The first part of the adventure is set in the future in Tim Trevyl's time machine; the second part is set on the night before the battle of Waterloo in Belgium.

Typing STORE will save the present position in the game, while RESTORE does just that – restores the stored situation. You will get killed quite a few times at the beginning of the game, since much of the adventure's sense of humour is tied up with finding amusing ways to bump you off! When you get killed, press 1 to restart the game from the beginning, or 2 to carry on from the last position you stored.

To save your position on disc, type SAVE a, SAVE b or SAVE with any other letter from a to z. The file will be saved (as War-a and so on). You can save up to 26 positions and reload any of them using LOAD followed by the correct letter.

You will find the game becomes progressively more difficult, culminating in overlay six which is extremely hard. If you are one of those players who do not like to get stuck for hours with an insoluble problem, hints and answers for the first three overlays will be found in coded form on pages 67 and 69. Find the question that best expresses your current frustration, type the command DC and when a question mark appears, carefully type each character of the Hint (H) or Answer (A) that follows your question. Provided you make no mistakes, the hint or answer to the problem should be decoded on screen as you type. Be very careful to distinguish between O and 0, I and 1, and the hyphen and underline symbols.

Good luck, and happy adventuring. There will be more about The Warlord next month – how it works and how it was created. In the meantime, here are some of the odder quirks to look out for: I am mentioned in the adventure, and so are two other people who work for or write in *Acorn User* – see if you can find us.

Warlord *is only available on the monthly disc. We regret that the length of the program makes it impossible to include in the yellow pages.*

WARLORD HINTS

```
Q: I GET LOST IN THE MIST
H: =KH7:AC@T)JM$=M9>M=F>\
A: @HQ.ACB4$496F99Y05MA<?!

Q: I KEEP DROWNING IN THE MARSH
H: R6FK(9U/[32OL96F=N36>AL?M4;@Q,CHX
A: LA5C@T'HQ.ACB4$496F99Y05MA<?!

Q: I CAN'T SEE ANYTHING IN THE DARK
H: R6FK.7@?\!R@6JA-M5B*
A: ?CE6\!_,5LCP!M6\,=>ALL)K[

Q: I GET BLOWN UP BY THE MINE
H: GAEL/?>MG'H=8\)JM/7Z6+KIO*
A: =K?Y-L4-J:[!MK;4AE9Y&L=>S44=M3*

Q: I GET SHOT BY A DEAD TROOPER
H: L2MD/NM96FK27>ALL&ICN,C@E5E9(
A: EC@<U%GG2R1=M3[&ICN!_7.<O??!

Q: I GET FATALLY BURNED BY COINS
H: M4=M3[!Q3[#L@=T#L:EEM.7<QN(=M3*
A: @K3@?\&ICN'H=8\72C@T'>OL96FK.AH1=M3*

Q: I GET CARRIED INTO SPACE BY A MISSILE
H: P19SL96FK32@FU)JM.AEL(=M3*
A: =K?Y-L4-J:[44=['H=8\/?R44=[2/LC_

Q: I CAN'T FIND THE CUBIX
H: <>K@=E9%4#>K@=E9'2,5S1MZ4,5S1M]
A: O3J6KL44=[#FKES444=IR5>2[44=[2/CEF

Q: I CAN'T GET THE DEAD TROOPER'S GOLD OR HIS LANCE
H: L2MD/NM96FK27>ALL&ICN,C@E5E9(
A: M>CO[M3"S?L44=M3",M!MAE4=MN,5M5B*

Q: I CAN'T GET THROUGH THE DESERT
H: E=D<K1?\%S85?EK5F?EM#>MR"C[5>2AO7#
A: A9Q2HMG3B=>B7J6E9'2)KS,M$A<CHMV

Q: I CAN'T FIND TIM TREVYL
H: L<>8=M5UG+CAH<M71=M3[(=[)J\
A: M4=[+>E9Y!M6\(AJM"JC@5CN,Q2\+CAHX

Q: I CAN'T GET OUT OF THE DESERT
H: M4AE=U"?BH#2)KS,M44=[7.NA1M<R$AN2MB[
A: K3O>/BB[96F=N3A1KCY4/CN'HQ%<RA[

Q: THE KING'S BLOODGUARD ARE NASTY TO ME
H: R,OL6+Q/M9:QN)JM45DS4>3QC3[,M&L7<I6+
A: L.XG45DS4>3QC3[,M.3L8*

Q: I GET LOST IN THE MOUNTAINS
H: FBC3[&I@=T96FZ
A: M4=M3[)JM.AE4AE9Y44=M3)2'HQ3<F?4'

Q: I CAN'T GET THROUGH THE FOREST
H: BKL*K>AL-<>ALL"C[!_4>/O_
A: @HQ.ACB4X4;Q'>OL/F?[

Q: HOW CAN I AVOID BEING ROBBED ON THE ROAD?
H: R6FK.7@?\3<>8[$AA?I5B*
A: ?CE6\!_7.<O??^4/CN0?H.M4O7T&L7<I6O\

Q: HOW CAN I MAKE USE OF THE GYPSIES?
H: R6FK.7@?\44=[-<J@6E9Y%G9H8IF[
A: @BM/[44=HS!_36CJ/MN"S?@;?!

Q: I GET KILLED IN THE BANDITS' CAMP
H: @>OL,I.HNG72K4X'H=8+
A: R6FK.7@?\44=['H=8\,C4H:O[

Q: I GET KILLED FALLING DOWN THE RAVINE
H: :O@B=2BEX)KL&L=>S44=[%<RA[
A: N>2[!_2=A5*

Q: I GET SHOT AT THE WEST GATE
H: I1S5<I5B[-LG&L7<I6+
A: P*HKL!SL44=[':S1[&ICN/?7[4A=<!

Q: I GET EXECUTED AT THE WEST GATE
H: M4=['N,Q2OM&CE6\3<>8O4AE9Y/7@?IE6M/*
A: R6FK-H>AL$N=AP44=[,5M5B*

Q: I GET EATEN ALIVE IN THE MOAT
H: R6FK-H>AL"C[6/MGG39CHX
A: <I=D5^"?BHU5;P4;Q44=["P7;C>*

Q: I CAN'T GET PAST THE DOG
H: ;M?7[);H9[#R=Z4"MC3?\!M6\(M99KGV
A: ?CE6\!_"M?7[4;Q'BM/[(AD"

Q: WHAT CAN I USE TO DISTRACT THE DOG?
H: EC@<U!Q=F96*2.AEL/?7["S?L44J3@\N
A: BER44=[7.G@ 444=[#BG@5QAY444=[1D,Q@GV

Q: A SOLDIER KNOCKS ME IN THE MOAT
H: K3G5WI?"C[&L7<I6HMG4;Q(ADTN
A: L.XG(=G@CQM3/CN!MK;4AE9Y%GG2*

Q: I CAN'T FIND THE WELL
H: K3<C\#>Q3AO7@MG/?R44=[.ACB4X7*K@#
A: GACB4O.NAL)ER44=[-4Q9:OL3>D,Q3*

Q: I CAN'T GET OUT OF THE WELL ALIVE
H: M4=['K/U3KEG/7Z96F=N%M@=CN!O@1KGM5>\
A: H?>MG4-J:[/?7[/3H;>QL72K4X96FZ

Q: I NEED SOME MONEY
H: EC@<U&ICN!_.7@?H9)@@A
A: '@@[ER44=[(9X:A-BH$

Q: I NEED SOME GOLD
H: M4=[,5M6HCC2#,M$=T2AL1MN(9RM#E9Q;"
A: M>GG44=[)E@RM3.AEL44=["?S@89AC<G8+

Q: I NEED SOME MORE SILVER
H: ?CIAAL'>OL,I.HNG72K4X'H=8+
A: M4=M3[)JM!_"S?@;?R)ER!_,C4H:?\2=@>"

Q: I NEED A THIRD SILVER BUTTON
H: H?7[7*RM$N=A@5?\/G/MN!_0B3>FG9:B*
A: EC@<U$KH7R)ER44=[2/U3E7*

Q: I'VE BEEN TO THE CITY BUT I STILL CAN'T FIND TIM TREVYL
H: M-J:[44=['R7CFN,M!CR3:B*
A: ;?BHU4;Q44=[3A-QBX4!M6\5>2[44=[2/CEF

Q: WHAT DO I DO ABOUT THE RUFFIAN?
H: :F@K3N@6F?R-<>ALL'>OL96FK3<>8R1=M3*
A: AAKL44=[2C1@C8MRM34C2:B*

Q: I CAN'T GET BACK PAST THE DOG
H: @BM/[)KL3<>8[%S-M1FJ2*
A: ?CE6\!_"M?7[!M6\44J=HI)K[

Q: HOW CAN I GET PAST THE CENTRAL COURTYARD?
H: ;C[/F=N'NONALM3/CN44=[+>E9 ,\
A: L5GHI44=HS96F=N)EH3K-S5F?!

Q: HOW DO I GET THROUGH THE ENTRANCE HALL?
H: R6FK(9U/[!_23P>.AJ9[)K1HS72K4X96FZ
A: @BM/[44=[)EH3K-S5F?!

Q: I'M NOT ALLOWED THROUGH THE CARVED DOORS
H: R6FK-H>AL"C[4;@Q30OC1@SV
A: ?CE6\44=[$N3N@6E9Y2=@>"

Q: THE GUARDS ARE FASCINATED BY MY ACCENT
H: ?;ROFE3S1[44=HS%Q/IR-BC3*
A: M-K?U!AMF?L45DS4>3QC3#

Q: I FALL TO MY DEATH FROM A TREE
H: R6FK!Q3[)ER4;@Q-H.EX/7Z!_(M=@GV
A: <I=D5^$KH7R"CAIC3[96FK-BG/[/7@)

Q: THE DOG WON'T GIVE ME WHAT I WANT
H: BKS,M!_'K3@?UG$K8(
A: M4=M3[!Q3[44J3@["M?7N[2'>OL!MAE4=M]

Q: WHAT USE IS THE HAYSTACK?
H: M4=[6+KIO[)JM72K4AE!
A: EC@<U)ER)KL&ICN3<>8O4AE9Y96FK.7@?+

Q: WHERE CAN I GET A WEAPON
H: :_3<?;:],5M5B'405M69OC,0
A: BER44=[&;QN7.NA[

Q: I NEED SOME GLASS
H: M4=M3[)JM0<9IFEG!Q=F96*2.7<QN!M6\&;Q]
A: M4=M3[)JM-BC3[449MR/?7[3<F=1B)244AE=$

Q: THE KING IS APPALLED BY MY LACK OF COURTESY
H: M5DS4>3QC3T+CAH<M719SL4;Q$K
A: K3<C\44=[.AE1[/?R44=["C?N=@>S$K@C]

Q: I GET EATEN BY A VOORVOKURP
H: E=B:[!_35=@KP96FK(9U/['H?7[!RA>/XV
A: M4=[0<5BB[96FK!Q3[)ER)JM!_4>/O_

Q: I CAN'T FIND A LAMP
H: @HQ4;Q44=[&;QN%<RAX4!M6\$KH7!
A: :SL44=["ME@;>S/7Z44=["?BHU3A-HIA\

Q: I HAVE BEEN ACCUSED OF THEFT AND THROWN IN THE DUNGEON
H: BKS,M27J8NG"CDE9Y05I@;C9N@\
A: ;SDG!_$N7E=UM3$K?Y-L3A1<K#

Q: I FALL AND BREAK MY NECK IN THE CITY
H: M4=M3[!Q3[/E4=MN7*X:M/7Z'H:E9Y4;Q-4Q9:O[
A: @HQ3<F?4$444=IR%<RAX444=IR.ACB4'

Q: HOW CAN I GET THE GREAT HUMMING DOOR OPEN?
H: M4=M3[!Q3[4C8Q36;ANM4;Q)K[
A: H?>MG&L=>S44=[)EE6;A*

Q: HOW CAN I GET INTO THE INDEX ROOM
H: R6FK(9U/[%T,NY4$K?Y-L96F*O
A: BEE=5>QL44=[$K@C]

Q: WHAT DO I DO WITH THIS FUNNY SHAPED HOLE?
H: BEE2MBL3<>8O4AE9Y44=[3.L8[359O5*
A: R6FK.7@?\!_(=S)FH?3KT+:TV

Q: I NEED SOME KEYS
H: @>OL96F=A2G:Z#>ODA=3?+
A: M4=["?M6EK?M(9U/[3<>8*

Q: I CAN'T FIND THE RAVINE FROM THE EAST
H: M4=M3[)JM!_01S4X,9<CEE9Y44=M3*
A: P.NAL&L=>S1D,Q@GG/CN.ACB4X&L=>S2=2C+

Q: I SEEM TO NEED AN INDEX CARD
H: M4=M3[)JM!_2=@>S&ICN44=[0E=>?D2*
A: ?CE6\!_7*XG)EF;Q44=[)E6ASH2=@>"
```

WARLORD HINTS

```
Q: I CAN'T OPEN THE SHUTTERED WINDOW
H: M>GG!MAE4=MN2=F?1*
A: M4=[72E6KHI78?Y-L/A5I 244=[$K@CN72C@#

Q: HOW CAN I GET INTO THE LEFT HAND BEDROOM?
H: M4=[-BDAL/3T3FF>M7*XV
A: R6FK.7@?\3<>8[+:T:\

Q: HOW DO I GET OUT OF THE BANDIT'S CAVE
H: =K?Y-L&IC5>OL)KS,M96F=N,I.HNG$=XV
A: AQ7>AE5J2[44=['N,Q2*23D2E9ZN

Q: I SEEM TO BE AN INEXPERIENCED ROCK CLIMBER
H: N>2[3B4K-AJ9[%LD4G=8IF[
A: :_2=A5[78F78\"C[5>2AO7#

Q: I CAN'T READ THE SCRAP OF PAPER
H: :_4>7:HU/7Z,9J?3Q2K
A: K3<C\)KL)ER44=[-<I@=C]

Q: I HAVE BEEN ACCUSED OF THEFT AND ESCORTED OUT OF THE CITY
H: M>GG44=["CNAL0?==:VV
A: R6FK-H>AL01XG&ICN44AE9LM)ER44=[-4Q9:O[

Q: THE GUARD WON'T LET ME GO DOWN THE BACK STAIRS
H: R6FK,C@<U-H.EX4;@Q3:4QB[
A: M-J:[/7@Z44=[2=3C[/CN44=[72>(

Q: I GET ACCUSED OF BEING A POISONER
H: R6FK35GF78JY-L7*M6AMN!Q=F96+
A: @HQ3A>/H>ALL"?BHU$KH7R44=[3A-HIA\

Q: WHERE CAN I GET AN INVITATION?
H: BER44=[-<;@H9[/7Z44=["?S@89AC<G8+
A: ?L=>S44=[+>E9 ,M"JC@5CN,Q2+

Q: I CAN'T FIND A WAY OFF THE BATTLEFIELD
H: M4=M3[)JM!_7*XU2+:@KP,C@<>E9(
A: ?CE6\44=[2=2C\!M6\&I=@CHI)KL.ACB4'

Q: I GOT SCRAPED OFF A WALL AND THROWN IN THE DUNGEON
H: :U9:;\/7@?I6EE9Y44=[,C4>KG\
A: ;SDG!_$N7E=UM396FR%@T.7@?\3<>8[-B?7TV

Q: I CAN'T GET SOMETHING SCREWED TO A DESK
H: BKL)JM0?D@69J9*
A: R6FK.7@?\!_3OO3R-N7M/M]

Q: I CAN'T GET ACROSS THE RIVER
H: M>GG7*K?>E9YM3/CN27;EE9Y(A>A'
A: ?CE6\44=["P7;C>*

Q: I CAN'T GET OUT OF THE RAVINE
H: FBC3[%LD4G=8IFL.7@?A?+
A: P.<QN44=[3=1BB["M@E?\

Q: THE KING IS OFFENDED BECAUSE I DON'T EAT
H: A=[-<>ALL"C[&I@=9?\"WG!_*;NA1M]
A: IB3O1I6\4;Q%<SL3<>8O4AE9(

Q: IS IT POSSIBLE TO GET OUT OF THE DUNGEON?
H: M4=M3[)JM/?>MG/?7[/3H;>QLOB3N2IF[
A: R,N[20E>5X44=[4-AJ9*

Q: I INCINERATED THE CITY ACCIDENTALLY
H: R6FK35GF78\/3CTG)EEA>C.Q5F?E\
A: =K?Y-LOE7@T44=[,9Q/M]

Q: I GOT A BLACK EYE AND A NOSE BLEED
H: ?;HEFL(=<QBL.7Q/MN78?R&;HI\@@A
A: I5MA6JAZ2(AKL44=[2C1@C8MR!F:HE!

Q: I THINK I GOT DRUNK ON THE BEAUJOLAIS
H: M4=M3[!Q3["CO@1MN5>2NM&ICN!K7L9G=#
A: =K?Y-L$N7E=U44=[72E7)296FK.7@?\)K[

Q: WHAT DO I DO WITH THE METAL DISC?
H: BKL78F78\&CKL)EF;Q!_3<4H:O[
A: ?O>2[44=[,=>AL?M72K4X)K[

Q: I CAN'T READ THE SCROLL
H: M4=M3[)JM/?7[72J2MN449MR96FZ
A: M-J:[)KL4;Q45DS4>3QC3#

Q: I JUST GOT KNOCKED TO THE FLOOR AND JUMPED ON
H: ;C[#>Q3AO7T71G>S96FK!S@-BH$
A: AAKL44=[2C1@C8MR"S?L.AQ/?7[%GG2*

Q: A TREE FALLS ON TOP OF ME
H: ;S?L)KL#LF78\(9U/["C@IR!_2=4H$
A: M5<[44=[2=A5[4;Q!_2=4H!4.AEL44=[4>3@*

Q: I TRY TURNING MY VEHICLE, WITH DISASTROUS RESULTS
H: P1A:EX7*XG$E;\44GD2['N,Q2OM'HOO
A: @HQ%<RAZ24>C>AL44=[!T?;A9CCE[

Q: THE BANDITS DON'T GIVE ME ANY KEYS
H: G7Q/MN"C[&L7<I6HMG72K4X44A<Q/N\
A: =K?Y-L35GHU4'BM/'4/CN/A5IR44=[,C4H:O[

Q: I JUST GOT ELECTROCUTED
H: L.E?OEG&CIAAZ2)KS,M"WG44=[$K@C]
A: LD2K/EX/7@Z44=[,=>AL[

Q: I GET SOLD A COMPUTER I DON'T WANT
H: ;C[-BC3[#>Q3AO7T!AMF?L719SL96FK"SDV
A: BEE=5>QL44=[7*S/E=NM&CIAA[

Q: I GOT EATEN BY A GIANT RAT
H: R6FK(9U/[4;Q4-J:[96F=N#E9M5BN\
A: =K?Y-L/A5IR44=[4>/O*&OE7@T44=[72I3*

Q: WHERE CAN I GET A ROPE?
H: :MR)EF1MAA1G@5QN4>/CEE9YO?DA[
A: ?L=>S44=['R7C6<N\

Q: I CAN'T LIGHT THE LAMP
H: =E;\96FK&IC5>OL3<>8O4AE98O
A: R6FK.7@?\3<>8[-4S/E=N\

Q: WHERE CAN I GET A TAG?
H: ?L=>S44=[32>R=7KEG/7@C:B*
A: BEE=5>QL44=[$AN8!444=IR/A5I @@A

Q: A DRY GREY POWDER WON'T BURN FOR ME
H: BKL-<>ALL)=Z)KL7*RM7.O[
A: I?F=N72E7[)EF;Q44=[,5LC_

Q: I JUST HIT THE BOTTOM OF A BOTTOMLESS PIT
H: EC@<U71=M3[96FK!Q3['H:E9(
A: E=>ALL44=[,5LCP!M6\4-J:[)KL72K4X96FZ

Q: WHAT DO I DO WITH A HOVERCYCLE?
H: R6FK#LF78\OB3O1I6\)KS,M!_(GCA2*
A: FBF9FL44=[44AE9%4/CN'>OL/?R)K[

Q: I TURN GREEN AND KEEL OVER SUDDENLY
H: R6FK35GF78\!U9:;\449SL&IC3D>GR&I@5+
A: ?I@=T44=[+>E9'2$K?Y-L%<S[

Q: HOW CAN I HELP TIM TREVYL? HE IS UPSET AND CONFUSED
H: L<>8=M5UG3A;=9[(AJM7*S/E'
A: M4=[#BIF-T=N72C@T32G@T96FK(AJM7*S/E'

Q: I GET CAUGHT BY A SECURITY ANDROID
H: ;C[-BC3[#>Q3AO7#
A: =K?Y-L27E9Y44=["CG@T/CN'HQ%<RA[

Q: I GET KILLED GOING UP THE RAPIDS
H: M>GG44=["CO@1MN01QBL/7Z6+KCF=]
A: M49SL)JM.AEL44=[7*XG4;Q44=[2/U3E7*

Q: I GET SHOT WHEN I LEAVE THE CUBIX
H: R6FK-H>AL45D8[)KL27>AL[
A: N>2[44=[63<R2E9Y3OO3@I!

Q: I GET LOST IN THE LIBRARY
H: R6FK.7@?\!R@6JA-M5B*
A: @>OL44=["CG@T!M6\27E9Y)K[

Q: I THINK I NEED A HEXAGONAL KEY
H: R6FK#LF78\-4J:[)K[
A: ?CE6\44=[(=S)FH?3KT-BF78+

Q: I HAVE BEEN DUMPED IN AN EMPTY TENT
H: R6FK.7@?\3<>8O4AE9Y4;Q#R?L72K4'
A: M-J:[44=["?X6?7OL72K4X96FY25>2[)K[

Q: I GET TORN LIMB FROM LIMB BY A HUNTING EAGLE
H: BKL-H>AL"C[6/MGG(M99KGV
A: M4J=HI$KH7R!_#L@<:?\2/SL&ICN)K[

Q: I ONLY FLOAT IN THE RAVINE
H: R6FK(9U/[!_'K/U3KEGOB=3J9HS!F:HE!
A: R6FK!Q3[#>Q@GOE9Y(=<UCG/3H;>Q?\

Q: I GET CRYOGENICALLY FROZEN
H: =K?Y-L4>7>@>MN44=[32>R=7KEG3O>M!
A: R6FK.7@?\!_32>R=7KEG4-F(

Q: I KEEP SETTING THE BENCH ON FIRE ACCIDENTALLY
H: K3<C\44=[)EEA>C.Q5F?E\
A: BEE=5>QL44=[#OC.F9J9*

Q: TIM TREVYL JUST HOLDS OUT HIS HAND FOR A BOOK
H: R6FK72C@T*K>AL(9U/[4;Q'>OL)KL&ICN(AD"
A: M>GG44=[,=9P/QGV

Q: THE LAMP SEEMS TO GO OUT SUDDENLY
H: R6FR%@T(9U/[4;QO<5MR!G=<C+
A: N>2[)KL71AC9[)KL,5RA?\

Q: THE SCREEN SHOWS ONLY SWIRLING MIST
H: R6FK!Q3['>O@5E9Y!G=<C\/7Z96F=A2G:)
A: R6FK$K?Y-L.7@?\44=[3OO3@IR45C@T,5S1M]

Q: I HAVE FOUND THE CUBIX BUT IT'S LOCKED
H: M5DS4>3QC3T+:@KCM)KL,C4H:?\5>B,K@MV
A: @HQ4;Q44=[#FKE"%44=IR5>2[44=[2/CEF

Q: I SEEM TO HAVE DUG MY OWN GRAVE AND FALLEN IN
H: P8F78\96FKOB3A?MN3<>8J?7[%GG2[)ER)K+O
A: CK8CP"?BHL*Q2OM/G/MN44=[(G=9*

Q: WE GOT ARRESTED BY THE SOLDIERS NEAR THE BRIDGE
H: M4=N2[&L3I5EX#>MR"C[%<R6CMG&I@=9?+
A: L=5<JU&L3I5EX4;Q44=H!244=IR'HQ.ACB4'

Q: MY BATTERIES HAVE RUN OUT
H: AGHI.7BE9>Q2O7T/7Z96FZ
A: =K?Y-L,9<U/[44=[2/CEFQ3D2K/E=?\/?!

Q: I CAN'T USE THE SCREEN
H: BKL(9RM!_#LG/MN/G/MN)K[
A: R6FK-H>AL/A5IR)KL&CIAA[
```

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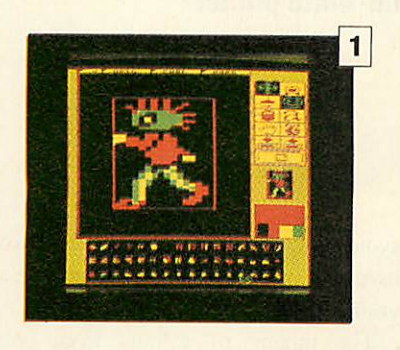
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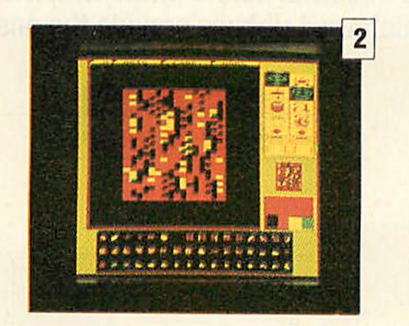
*We are mainly Mail Order but personal callers are welcome to collect goods and arrange for demonstration of computers and accessories.
Please Telephone to arrange appointment first.

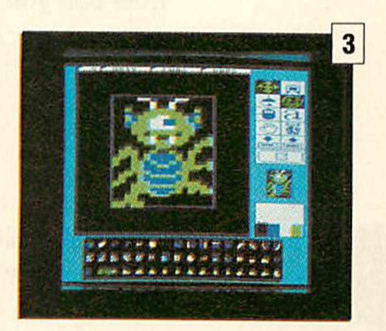
COMPETITION

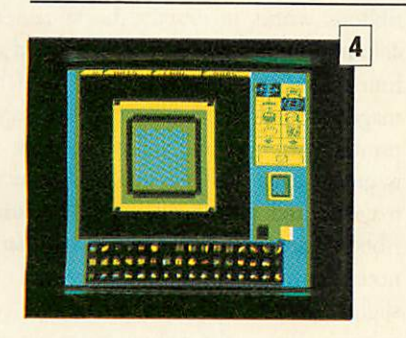
LOVABLE LIZARDS

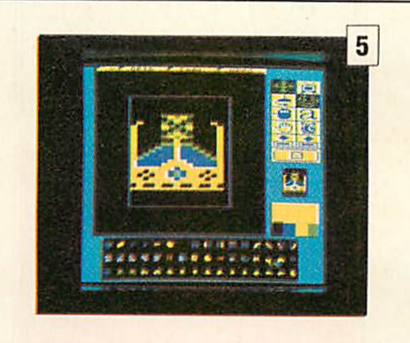
We have a cuddly life-size *Repton* to give away this month along with games from the Superior catalogue

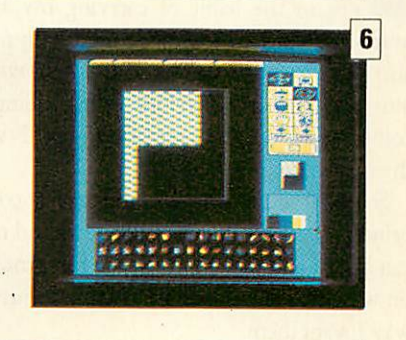

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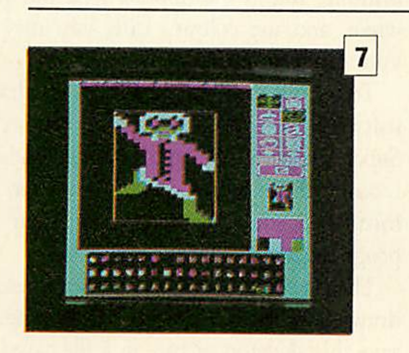

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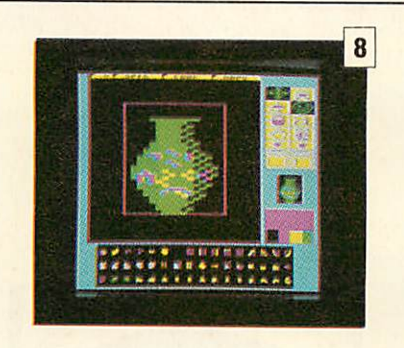

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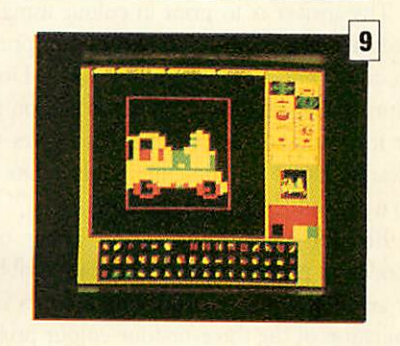

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9

Repton the lizard, star of the original *Repton* game by Tim Tyler, has spawned no less than five follow-ups. The mix of problem-solving exploration and amusing scrolling graphics has attracted BBC micro users like no other game.

Now publisher Superior Software is offering little Repton soft toys to confirmed fans. But *Acorn User* has a unique five-foot-high cuddly Repton to give away. Plus the winner will get his or her choice of any three games from the Superior Software's BBC and Electron game catalogue. The 30 runners-up will also receive their choice of any of the Superior games.

All you have to do to enter the competition is look at the nine screens above. For each character or object, numbered 1 to 9, identify which of the *Repton* games it comes from. Use the letters A to F as follows:

A *Repton*
B *Repton 2*
C *Repton 3*
D *Around the World in 40 Screens*
E *The Life of Repton*
F *Repton thru Time*

As a tie-breaker, we want you to think up an idea for a new set of screens for *Repton*. Describe your idea in less than 40 words, and devise a suitably imaginative title.

Write your answers on the back of an envelope and place your tie-breaker idea and your name and address inside. Also stick the coupon below to your entry — it can't be accepted without it. Send it to *Acorn User Repton* Competition, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Your entry must arrive by September 5, and the editor's decision will be final.

ACORN USER
COMPETITION
AUGUST

BUY A YELLOW RIBBON

How can you create beautiful colour prints with a black-and-white printer? Coloured ribbons provide the answer

Muriel Dearlove

It's fine having beautiful, animated graphic screens that you can show off to your friends, but what I want is something I can put in my pocket, and I am not in the habit of carrying my BBC micro and colour monitor around with me! I also want to make greeting cards that will fit into an ordinary envelope. I'm willing to compromise on the animation, but I want them in colour!

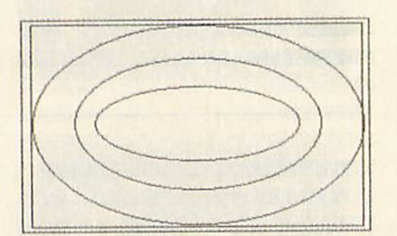
So what do I do? I could use a colour printer, of course, but first I have to find one I can afford and that I have space for. And one on which I can control the colours to just the way I want them.

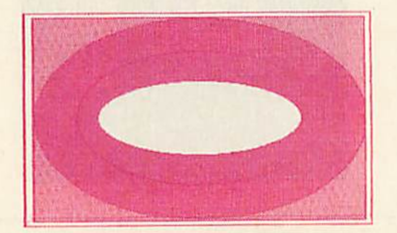
The answer is to print in colour using my ordinary black-and-white dot-matrix printer. In the April issue of *Acorn User*, Dorian Goring suggested using coloured carbon paper for multi-colour printing. This gives very clear results, but almost inevitably limits you to using only black, red and blue.

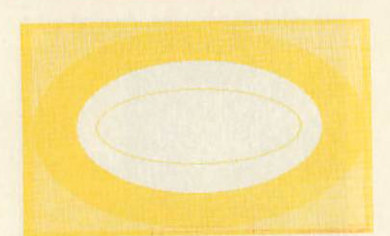
But for most Epsons, and many other models of printer, a range of coloured ribbons is available, and by overlaying colours in an imitation of the three-or-four-colour printing method used to print magazines like *Acorn User*, quite passable results can be achieved. What's more, you aren't limited to the standard two or four colours available on the screen in a high-resolution mode. Several firms provide coloured ribbons, in particular, Micro-Media supplies red, blue, yellow, brown and green ribbons which are suitable for a wide range of printers.

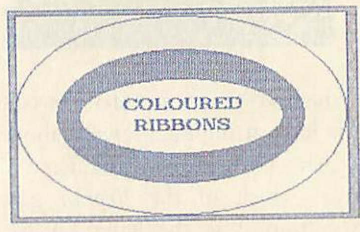
The technique, similar to that described by Dorian Goring, can be either simple or complex, according to the standard of output you need.

Before overprinting each of the colours, accuracy in positioning the paper is vital. This avoids colour fringing. But the actual colours used and the mixture of colours are under your control.









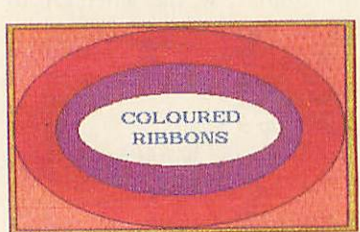


Figure 1. How a multi-colour print is built from a skeleton drawing

The mixing of colours from coloured ribbons works in exactly the same way as colour printing. *Acorn User* is printed using four-colour inks – yellow, cyan (light blue), magenta (pink) and black. If the paper is printed with cyan and yellow, then the result is green; cyan and magenta make blue; and magenta and yellow make red. Because the ribbons are red and blue rather than the necessary magenta and cyan, they tend to give slightly deeper colours than true four-colour printing. But as the ribbons wear out after a while, and the colours fade, you may find your results improve.

To try out the method, almost any drawing software will do. I regularly use AMX *SuperArt*, with a Wigmore mouse, and more recently the excellent *Quest Paint* from Watford, but, of course, one of your own programs will do just as well.

The first step is to put together a design or drawing in black on a white background, then save this skeleton picture in a file called, say, 'Black'. It is unlikely that you will ever need to print this picture, but it will act as a base for drawing the blue, yellow and red screens of the final colour picture. Figure 1 shows an example of a simple design using rectangles and ellipses.

SuperArt uses a very short 'grey scale' — only black, white and two intermediate shades of grey are available. The colour the screen shows is irrelevant for the greys; what is printed is always one light grey and one dark grey. But I find that setting the screen to red for the light grey and green for the dark grey makes it easy to see what is going on. This means that you can have up to three shades of



pure blue in the final colour print — a fully saturated blue when you use black on the screen, plus a faint and an intermediate blue when you use the two greys on screen.

The idea is to work on the black screen, which is always reloaded in preparation for each colour. First you must modify the skeleton to produce a screen for the blue ribbon, saving that as 'Blue'. Then load in the 'Black' file again, and modify it for the red ribbon, remembering that if an area is marked to print on both the blue and red screens, then the final colour print will be a shade of violet, tending towards blue as the ribbons fade. The violet or blue can be light or dark, depending on whether you have used a dark or light fill pattern on screen. Save the 'Red' file, reload the black screen, and do the same again for the yellow ribbon. Yellow overprinted with red will either give orange, or a shade of red with a worn ribbon.

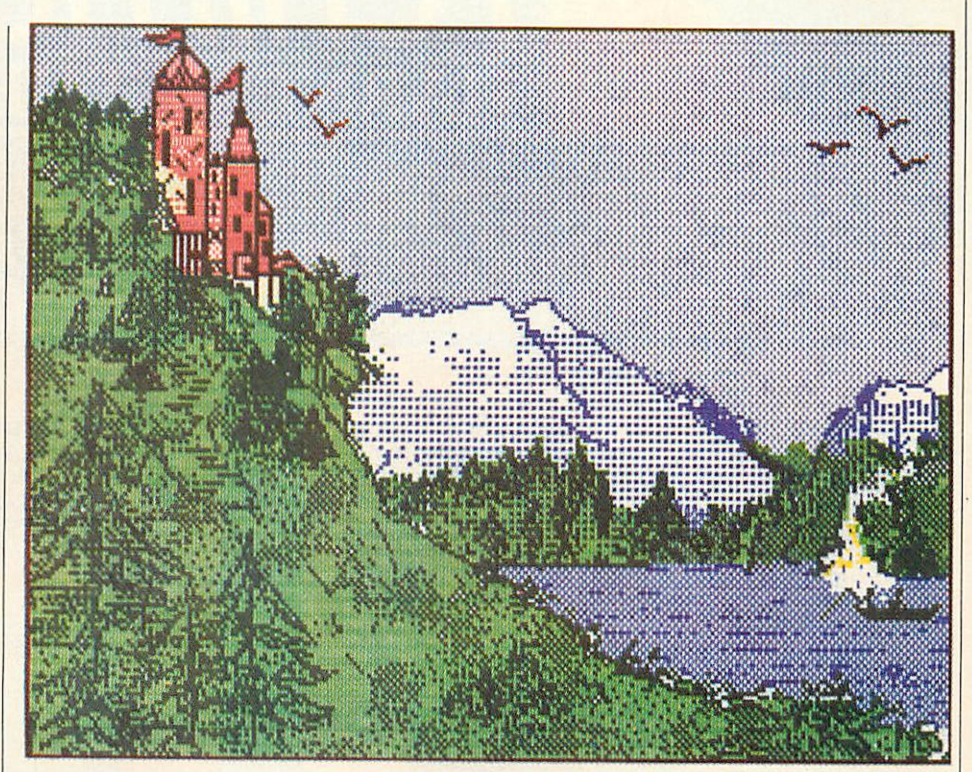
Having saved all three coloured screens, you are now ready to do the printing. First, fit the blue ribbon and prepare the paper. Remember you have to set the paper at exactly the same point at least twice more, in order to get accurate registration. To do this easily, I print a row of '=' signs across the paper, and find these simple to align with the printer's tear bar before overprinting with each ribbon. Alternatively, you could draw a pencil line along the top of the paper bail, and go back to that.

Once the paper is set up, load and print the blue screen using your usual screen dump. Then load in the red screen, change the ribbon, reset the paper to the original mark, and print again. Do the same with the yellow screen and ribbon. You now have the finished pattern, in violet and two shades of orange, with a pale green border.

The outline is a passable black where all three colours are overprinted. If you need a really dark black, it can be worthwhile printing a fourth pass with the printer fitted with its usual black ribbon. This then exactly mimics the four-colour printing process used to print magazines like *Acorn User*. Of course you can use the skeleton screen to prepare the image for this too. The order in which you print the colours doesn't appear to be too important, but I use yellow last because it is a weak colour and can be overpowered by the stronger ones. But this makes the ribbon dirty, as the other colours rub off the paper a bit. Real printing presses print the black ink first, then blue and red overlay it, followed by the yellow. Essentially this is the darkest ink first, progressing to the palest.

The illustrations in Figure 2 show some of the pictures I have drawn and printed using the multi-ribbon method. I've produced lots of birthday and Christmas cards this way too. Try it — it does need some time and patience, but it doesn't need too much artistic talent, thank goodness.

Coloured ribbons can be obtained from Micro-Media, Freepost, Rydal Mount, Baker Street, Potters Bar, Herts EN6 3BR. Tel: (0707) 52698. Also, Computers by Post, 12 Sutton Lane, Banstead, Surrey SM7 3QP. Tel: 01-760 0014.



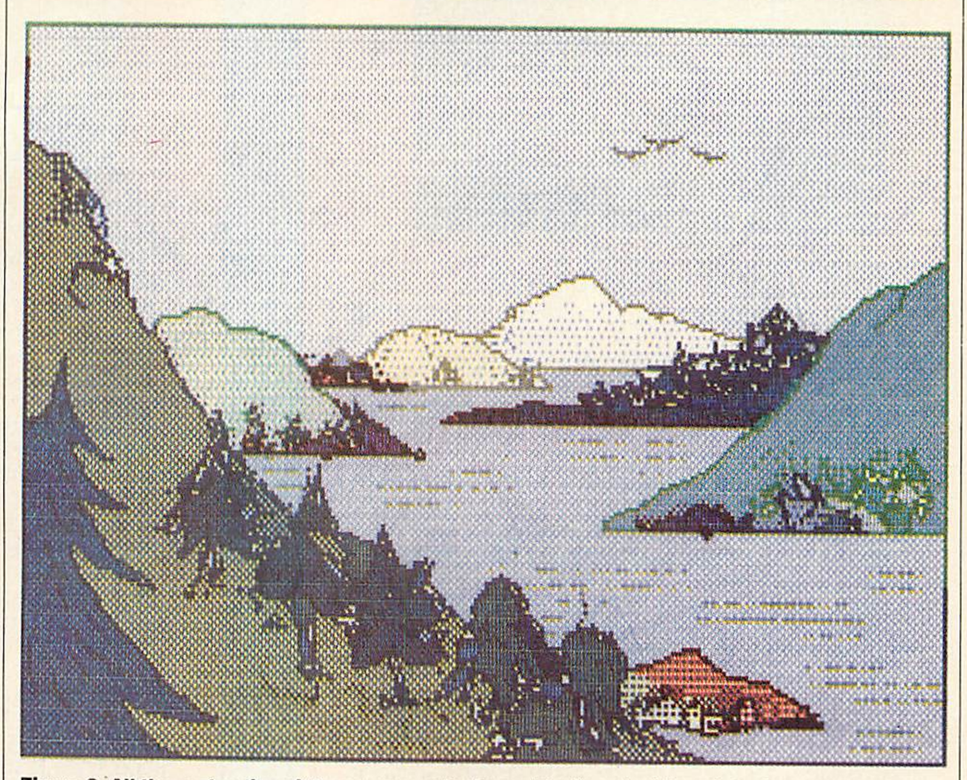


Figure 2. All these stunning pictures were output on a black-and-white printer by an overprint technique using combinations of coloured ribbons



Alpha-Base

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Alpha-Base is the successor to **Beta-Base,** the top selling database for the BBC micro. Alpha-Base really does '**HARNESS THE POWER**' of the Archimedes. As with all Clares products we have made **Alpha-Base** powerful but easy to use. You can be using a database within 5 minutes of receiving the program - that's easy. But don't be fooled, you do not lose any functions or power. Here are just some of the functions:



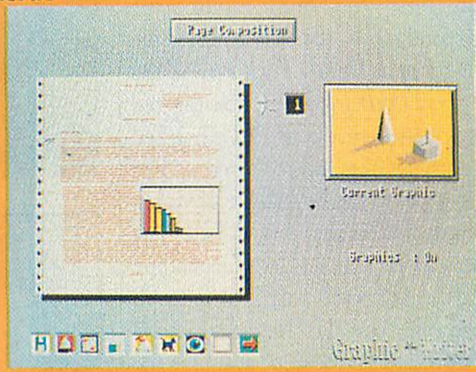
* WIMP based using icons and mouse
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MICRO USER April 1988

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MICRO AS ALLY

Teachers must impose standards to make proper use of the computers in their classrooms

Chris Drage and Nick Evans

With the use of computers expanding in every walk of life it was inevitable that it should rapidly become part of the classroom. This isn't part of an insidious technological plot, but the result of the integration of information technology into the activities of the 'outside world'.

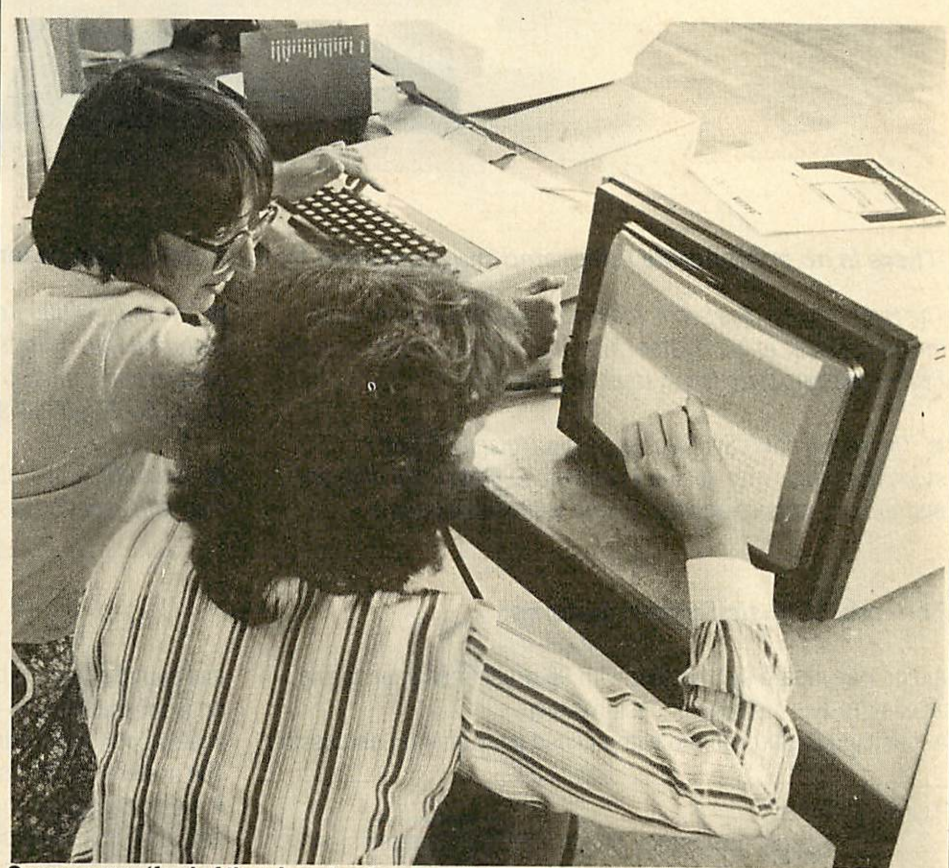
The development of the use of computers in schools has not been painless. In the past, software which was inflicted upon an unsuspecting teaching community was often not what it might have been, in particular in its suitability for education and its reliability. There is many a disheartened teacher who has been scared off computers and information technology in the classroom for life by bad software and unreliable equipment. Basic principle number one: a computer is only as good as its software.

Nowadays, both software and hardware have improved in many ways – generally because classroom teachers cried stop! One of the main reasons for using a computer is that it offers a number of fundamental 'tools' which are of use to both pupils and teachers, irrespective of which subject is being learned or taught. These tools – wordprocessors, databases, graphics packages and so on – are the real foundation of what the computer is all about. Familiarity with this type of software will generally guarantee that you get value out of your computer hardware. Packages like these are often called 'framework' software. So principle number two is: computer tools must be the foundation of any software library.

Naturally there are schools, and you may be in one, where 'the computer' lurks somewhere in a cupboard, or where it has been appropriated by one member of staff – usually male – who considers that it is best used for 'private study' at home. The chances of integrating information technology into the curriculum under these circumstances are slim.

The fact is that if you do see the computer as just another part of your arsenal of classroom resources, you will find a number of changes taking place. The computer motivates children like no other resource – except perhaps your own skill as a good teacher. Children enjoy using the computer because it is non-judgemental – except for a few detestable items of software which purport to teach by insult. Nor does the computer inhibit them, although experience suggests it may well inhibit adults at first.

Groups of children around a computer develop a corporate mind, intent on solving the problem using the resource, and developing the theme of the software to its full potential. Also, the children almost certainly have a great deal of fun! It is unlikely to be quiet fun, so if you're the kind of teacher who demands a peaceful working atmosphere you will need to find a special area for working on the computer where it isn't going to disturb the rest of the class. The noise won't be due to disruptive behaviour, it will just be the language of discussion, enthusiasm and dynamic interaction. Basic principle number three: computers are liberating and not prescriptive.



Once over any 'fear' of the micro, teachers may find a partnership develops

And what of yourself? The computer will change things for you. Your classroom can never be quite the same again after you have successfully used a computer in your work with children. You will discover that the machine can act as a third party in your classroom, engendering a new, triangular relationship between yourself, it and the children. This often develops into a true partnership, especially in situations where you are perhaps as much in the dark as the children. You approach the task that is demanded by the computer together. Does that sound threatening? Perhaps it might, yet many teachers have found that as a resource for stimulating learning, providing tools for the handling and production of information and for the creation of high-

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By special arrangement with Hybrid Technology, all *Acorn User* readers buying the Music 5000 synthesiser will also receive four AMPLE albums (*COSMIX*, *Ample Bytes Back*, *Music City* and *Inside Stories*) worth over £17, totally free. Our readers who purchase the Music 5000 and 4000 will be sent the four AMPLE albums plus the AMPLE Nucleus Programmer Guide, worth £36, absolutely free. This offer is exclusive to *Acorn User* magazine.

The Hybrid Music System is compatible with the BBC micro models B, B+, B+ (28k) and Master 128 with DFS compatible disc drive. Shadow RAM is used if available.

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Please send this coupon with your remittance to **Music Offer, Acorn User Merchandising, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

quality text and graphics, the computer has no parallel. Basic principle number four: the computer changes the nature of classroom interaction.

Access to information and experiences can come to you through your computer. In the same way that you may read journals, attend in-service training or discuss with colleagues the methods by which you have tackled a particular topic, so the computer offers a means of transmitting other people's experience into your classroom. This extra input can only enrich your lessons. For example, on-line systems such as NERIS (National Educational Resources Information Service) help you find information relating to countless topics.

Don't forget that the computer also provides a route by which you may want to circulate your ideas as well – software houses are always actively seeking out good practice and software provision is very much a two-way process. This discourse often takes place through information services that are 'talked to' by a computer. You may think that the idea of your classroom 'talking to' another in Australia is a little far-fetched – the stuff of science fiction? It's happening on a regular basis, in this country, right now. You can be part of it. And it's not just Australia; many parts of the world are linked by computer-based electronic mail and information services that are attempting to break down the barriers of race and culture, and helping the 'global village' become a reality. If this seems like something that you should be sharing in, then you have the equipment, or most of it, in your school already. The largest hurdle is your self-confidence. Once over that there will be no stopping you! So principle number five is: computers bring the world of information to your doorstep.

With your computer you can broaden the frontiers of what the classroom has to offer. But it is not just the toy in the corner with which you reward the fast workers. It is a device which extends the role of both the pupil and the teacher.

With the right sort of software, the student becomes more of an active learner than a passive receptacle to be filled with knowledge. We are all aware that first-hand experience promotes learning much better than passive reception of information. Good software provides that experience, especially in areas which are difficult to experience directly. For example, geographical software like *Wagons West*, from Tressel Publications, which we looked at in the February issue, enables students to



Computers alter classroom dynamics

experience life as a migrant in the wild west of 19th-century America. Moreover, it can help students organise information – it provides a learning tool which is complementary to the resource centre in your school.

For the slow learner, the disabled student or indeed anyone with special physical or educational needs, the computer is a great releasing agent. It can provide a bridge over a child's disability and a means of expression they otherwise lack. Basic principle number six is: computers change attitudes to both teaching and learning.

Teachers may capitalise on all the points that apply to pupils as well. But if you feel that the computer has designs on your job, or indeed if you want it to take over, then you are crediting it with an ability it doesn't have. A computer is not intelligent – and never will be in that sense, despite what may happen in science fiction stories. It may be an excellent actor, but it will never do more than pretend to think about a problem. Having said that, it can do mind-boggling calculations and operations in a fraction of the time taken by a human. But it is you, the teacher, who provides the intelligence, in the way that you integrate the computer, capitalise on it and make use of it for the good of the class.

The computer is not intelligent, caring or responsible. It cannot see frustration on a child's face, and it has no power to see inside the student's mind. It's up to the teacher, in co-operation with the developers of good educational software to reproduce and exploit experiences which are usually outside the capabilities and resources of the classroom. Ultimately, only the teacher can entrain the enthusiasm of the children. The seventh basic principle is: teachers are intelligent – computers are not.

So why use the computer? The 'because it's there' approach is not adequate in terms of philosophy, curriculum integration or good teaching practice. It is vitally important that you know exactly why you are using the computer in the classroom. How does it integrate with the on-going work in your theme or subject? Is its use planned or haphazard? How does it improve the traditional methods of teaching, learning or writing? How do you plan its timetabling among the children, and how do you justify the decision to let individuals or groups use, or even monopolise, the machine? Or have you decided that the computer sits on the teacher's desk and is only used under your supervision? Are you certain that when the adviser or inspector walks in that you can justify your use of the computer?

If all these questions are putting you off the idea of even thinking about a computer, consider the thought and planning that goes into the decision to use a particular television or radio broadcast. You would not permit the use of any programme unless you felt certain that it meshed with your own objectives. The occasional use of the TV when they need a rest generally leaves teachers feeling guilty – and the same applies to the computer. So the software you choose must be appropriate to your teaching needs.

Generally there is a great deal of thought and planning put into developing a piece of software. But if it is not appropriate to your teaching style, then don't use it. The greatest danger with computers in the classroom is that the tail can all too easily begin to wag the dog. So principle number eight is simply: computer integration must be planned to fit into local conditions.

If you have read this far, then the door is open for you to begin considering the computer as a tool in your classroom. Use the services provided by your local authority and national bodies to help you in your search for software and information. Don't be inhibited by those people who insist on using computer-speak – there is nearly always sense underneath it all. Above all, be open to the wide range of possibilities which use of the computer can offer you.

Nick Evans and Chris Drage are the authors of The Guide to Computers in the Classroom *to be published in October 1988 by LDA, 32 Bridge St, Cambridge.*

YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Hints & Tips	79											
Listing 1		■	■	■	■				■	■		■
Listing 2		■	■	■	■	■	■	■	■	■	■	■
Listing 3		■	■	■	■	■		■	■	■	■	■
Listing 4		■	■	■	■	■		■	■	■	■	■
Arc Agora	84											
Listing 1-4							■		■	■	■	■
Joe's Jottings	87											
Listings 1			■	■	■		■	■	■	■	■	■
Network Page (1)	94											
Listings 1-3		■	■	■	■			■	■	■	■	■

Note
1.Requires Teletext Adapter & ATS ROM

HINTS & TIPS

See Hints & Tips, page 33

Listing 1. Instant text dump

```
   10 REM print screen f
unction
   20 REM by David Ather
ton and Graham Bell
   30 REM for BBC B/B+/M
/C
   40 REM (c) Acorn User
 August 1988
   50 :
   60 osbyte=&FFF4
   70 oswrch=&FFEE
   80 evntv =&0220
   90 printw=80
  100 :
  110 FOR pass=0 TO 3 ST
EP 3
  120 P%=&0900
  130 :
  140 [
  150 OPT pass
  160 .instal
  170 LDA evntv
  180 CMP #entry MOD 256
  190 BNE notin
  200 LDA evntv+1
  210 CMP #entry DIV 256
  220 BNE notin
  230 BRK
  240 OPT FNequb(128)
  250 OPT FNequs("PrtSc
already installed")
  260 BRK
  270 .notin
  280 SEI
  290 LDX #entry MOD 256
  300 LDY evntv
  310 STX evntv
  320 STY exitv
  330 LDX #entry DIV 256
  340 LDY evntv+1
  350 STX evntv+1
  360 STY exitv+1
  370 CLI
  380 LDA #14
  390 LDX #4
  400 JSR osbyte
  410 RTS
  420 :
  430 .entry
  440 PHP
  450 PHA
  460 TXA
  470 PHA
  480 TYA
  490 PHA
  500 LDA #129
  510 LDX #150
  520 LDY #255
  530 JSR osbyte
  540 CPX #255
  550 BNE exit
  560 LDA #129
  570 LDX #254
  580 LDY #255
  590 JSR osbyte
  600 CPX #255
  610 BNE exit
  620 LDA #13
  630 LDX #4
  640 JSR osbyte
  650 CLI
  660 JSR prinsc
  670 LDA #14
  680 LDX #4
  690 JSR osbyte
  700 .exit
  710 PLA
  720 TAY
  730 PLA
  740 TAX
  750 PLA
  760 PLP
  770 JMP (exitv)
  780 :
  790 .exitv   OPT FNequw
(0)
  800 .xpos    OPT FNequb
(0)
  810 .ypos    OPT FNequb
(0)
  820 .width   OPT FNequb
(0)
  830 .wid2    OPT FNequb
(0)
  840 .lines   OPT FNequb
(0)
  850 :
  860 .prinsc
  870 LDA #134
```

Continued ▶

◀ **Hints & Tips listing 1 continued**

```
 880 JSR osbyte
 890 STX xpos
 900 STY ypos
 910 LDA #30
 920 JSR oswrch
 930 LDA #135
 940 JSR osbyte
 950 TYA
 960 ASL A
 970 TAY
 980 LDA size,Y
 990 STA width
1000 STA wid2
1010 LDA size+1,Y
1020 STA lines
1030 :
1040 .loop
1050 LDA #135
1060 JSR osbyte
1070 TXA
1080 BNE loop1
1090 LDA #32
1100 .loop1
1110 JSR princh
1120 JSR movprt
1130 JSR movcur
1140 BNE loop
1150 LDA #12
1160 JSR princh
1170 LDA #31
1180 JSR oswrch
1190 LDA xpos
1200 JSR oswrch
1210 LDA ypos
1220 JSR oswrch
1230 LDA #7
1240 JSR oswrch
1250 RTS
1260 :
1270 .princh
1280 PHA
1290 LDA #3
1300 LDX #10
1310 JSR osbyte
1320 PLA
1330 JSR oswrch
1340 LDA #3
1350 JSR osbyte
1360 RTS
1370 :
1380 .movprt
1390 DEC wid2
1400 BNE nonewl
1410 .newl
1420 DEC lines
1430 LDA width
1440 STA wid2
1450 CMP #printw
1460 BEQ nonewl
1470 LDA #13
1480 JSR princh
1490 LDA #10
1500 JSR princh
1510 .nonewl
1520 RTS
1530 :
1540 .movcur
1550 LDA lines
1560 BEQ nonewc
1570 LDA #9
1580 JSR oswrch
1590 .nonewc
1600 RTS
1610 :
1620 .size
1630 OPT FNequb(80)
1640 OPT FNequb(32)
1650 OPT FNequb(40)
1660 OPT FNequb(32)
1670 OPT FNequb(20)
1680 OPT FNequb(32)
1690 OPT FNequb(80)
1700 OPT FNequb(25)
1710 OPT FNequb(40)
1720 OPT FNequb(32)
1730 OPT FNequb(20)
1740 OPT FNequb(32)
1750 OPT FNequb(40)
1760 OPT FNequb(25)
1770 OPT FNequb(40)
1780 OPT FNequb(25)
1790 .end
1800 ] NEXT
1810 :
1820 PROCchecksum (&900
,end-1,&8060)
1830 PRINT "Press I to
install or S to save cod
e"
1840 PRINT "After insta
llation, press CTRL COPY
"'"for a screen dump"
1850 I%=GET
1860 IF I%=ASC "I" THEN
CALL &900
1870 IF I%=ASC "S" THEN
PROCoscli("SAVE PRTSC 9
00 "+STR$~end)
1880 END
1890 :
1900 DEF FNequb(b%)
1910 ?P%=b%
1920 P%=P%+1
1930 =pass
1940 :
1950 DEF FNequw(b%)
1960 ?P%=b% MOD 256
1970 P%?1=b% DIV 256
1980 P%=P%+2
1990 =pass
2000 :
2010 DEF FNequs(b$)
2020 $P%=b$
2030 P%=P%+LEN(b$)
2040 =pass
2050 :
2060 DEF PROCoscli(stri
ng$)
2070 DIM X% &FF
2080 Y%=X% DIV 256
2090 $X%=string$
2100 CALL &FFF7
2110 ENDPROC
2120 :
2130 DEF PROCchecksum (
start,end,sum)
2140 C%=0
2150 FOR I%=start TO en
d
2160 C%=C%+?(I%)
2170 NEXT
2180 IF C%=sum THEN END
PROC
2190 PRINT "Please chec
k listing"
```

Listing 2. Scrabble scorer

```
 10 REM Scrabble Scorer II
 20 REM by Richard Wain
 30 REM for B/B+/E/M/C/A
 40 REM Acorn User Aug 88
 50 :
 60 DIM letts$(50),leftlet$(10)
 70 MODE 6
 80 PROCheader
 90 INPUTTAB(0,2)"How many players (1-
4) :" N
100 IF N>4 OR N<1 VDU 7:GOTO 50
110 DIM name$(N),score%(N),none(N)
120 FOR A%=1 TO N
130 PRINT'"Player ";A%;" Enter your na
me : ";
140 score%(A%)=0
150 INPUT "" name$(A%)
160 NEXT
170 :
180 CLS
190 PROCheader
200 PROCdisplay
210 REPEAT
220 FOR P%=1 TO N
230 PRINT TAB(0,(P%*4)-3);"Player ";P%
;", ";name$(P%)
240 INPUT "What is your word";SPC22;TA
B(20,(P%*4)-2);word$
250 length=LEN(word$)
260 FOR letts%=1 TO length
270 letts$(letts%)=MID$(word$,letts%,1
)
280 NEXT
290 total%=0
300 FOR loop=1 TO length
310 RESTORE
```

Continued ▶

◄ **Hints & Tips listing 2 continued**

```
  320 FOR check=1 TO 26
  330 READ letter$,value%
  340 IF letter$=letts$(loop) total%=tot
al%+value% ELSE 370
  350 IF letts$(loop+1)="l" total%=total
%+value%
  360 IF letts$(loop+1)="h" total%=total
%+(2*value%)
  370 NEXT
  380 IF letts$(loop)="d" total%=total%*
2
  390 IF letts$(loop)="t" total%=total%*
3
  400 NEXT
  410 PRINT TAB(0,(P%*4)-1)"Word scores
";total%;SPC22
  420 PRINT TAB(0,17);"Are you sure this
 is right (Y/N) ";:S$=CHR$(GET AND &DF)
  430 PRINT TAB(0,17);SPC38;
  440 IF S$<>"Y" AND S$<>"N" VDU 7:GOTO
420
  450 IF S$="N" GOTO 230
  460 score%(P%)=score%(P%)+total%
  470 NEXT
  480 PROCscores
  490 PRINT TAB(0,17);"Have you finished
? (Y/N)";SPC9;
  500 F$=CHR$(GET AND &DF)
  510 PRINT TAB(0,17);SPC38;
  520 IF F$<>"Y" AND F$<>"N" VDU 7:GOTO
500
  530 UNTIL F$="Y"
  540 :
  550 combine=0
  560 CLS
  570 PROCdisplay
  580 FOR final%=1 TO N
  590 PRINT TAB(0,(4*final%)-3);"Player
";final%;", ";name$(final%); ", What hav
e you left?"
  600 INPUTTAB(0,(4*final%)-2);left$
  610 total=0
  620 length%=LEN(left$)
  630 IF length%=0 THEN none(final%)=1:G
OTO 760: ELSE none(final%)=0
  640 FOR loop=1 TO length%
  650 leftlet$(loop)=MID$(left$,loop,1)
  660 NEXT
  670 FOR loop2=1 TO length%
  680 RESTORE
  690 FOR check=1 TO 26
  700 READ check$,value
  710 IF leftlet$(loop2)=check$ total=to
tal+value
  720 NEXT
  730 NEXT
  740 combine=combine+total
  750 score%(final%)=score%(final%)-tota
l
  760 PRINT TAB(0,(4*final%)-1);"You hav
e ";total;" left"
  770 NEXT
  780 FOR loop=1 TO N
  790 IF none(loop)=1 THEN score%(loop)=
score%(loop)+combine
  800 NEXT
  810 PROCscores
  820 :
  830 PRINT TAB(0,18);"Do you want a pri
ntout? (Y/N) ";
  840 P$=CHR$(GET AND &DF)
  850 IF P$<>"Y" AND P$<>"N" VDU 7:GOTO
840
  860 IF P$="Y" PROCprintscore
  870 END
  880 :
  890 DATA A,1,B,3,C,3,D,2,E,1,F,4,G,2
  900 DATA H,4,I,1,J,8,K,5,L,1,M,3,N,1
  910 DATA O,1,P,3,Q,10,R,1,S,1,T,1,U,1
  920 DATA V,4,W,4,X,8,Y,4,Z,10
  930 :
  940 DEF PROCdisplay
  950 FOR S%=1 TO N
  960 PRINT TAB(0,19+S%);"Player ";S%;",
 ";name$(S%)
  970 PRINT TAB(20,19+S%);" Your score i
s"
  980 NEXT
  990 PROCscores
 1000 ENDPROC
 1010 :
 1020 DEF PROCscores
 1030 FOR S%=1 TO N
 1040 PRINT TAB(35,19+S%);score%(S%)
 1050 NEXT
 1060 ENDPROC
 1070 :
 1080 DEF PROCprintscore
 1090 CLS
 1100 VDU 2
 1110 FOR A=1 TO N
 1120 PRINT '
 1130 PRINT "Player ";A;", ";name$(A);
 1140 PRINT ;TAB(20);" Your score is ";s
core%(A)
 1150 NEXT
 1160 VDU 3
 1170 ENDPROC
 1180 :
 1190 DEF PROCheader
 1200 COLOUR 0
 1210 COLOUR 129
 1220 PRINT " Acorn User Scrabble Scorer
 Mk II ";
 1230 COLOUR 1
 1240 COLOUR 128
 1250 ENDPROC
```

Listing 3. 8-pin dump enhancer (for NEC Pinwriter)

```
   10 REM Dump to 24-pin
 printers
   20 REM by Martin Hesk
eth
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 August 1988
   50 :
   60 insert=?(?&FFB7+25
6*?&FFB8+&2A)+256*?(?&FF
B7+256*?&FFB8+&2B)
   70 FOR pass=0 TO 3 ST
EP 3
   80 P%=&900
   90 [OPT pass
  100 .start
  110 CPX #3
  120 BNE send
  130 STA block
  140 PHA
  150 TXA
  160 PHA
  170 TYA
  180 PHA
  190 LDA #128
  200 LDX #252
  210 LDY #255
  220 JSR &FFF4
  230 CPX #4
  240 BMI full
  250 :
  260 LDA block+1
  270 CMP #1
```

Continued ►

◄ Hints & Tips listing 3 continued

```
280 BEQ code
290 CMP #2
300 BEQ jmplength
310 CMP #4
320 BEQ jmpcode1
330 CMP #3
340 BNE jmp
350 JMP expand
360 .jmp
370 LDA block
380 CMP #27
390 BEQ escape
400 .ins
410 PLA
420 TAY
430 PLA
440 TAX
450 PLA
460 .send
470 JMP insert
480 .jmplength
490 JMP length
500 .jmpcode1
510 JMP code1
520 .full
530 PLA
540 TAY
550 PLA
560 TAX
570 PLA
580 SEC
590 RTS
600 :
610 .escape
620 LDA #1
630 STA block+1
640 LDA #27
650 JSR input
660 .return
670 PLA
680 TAY
690 PLA
700 TAX
710 PLA
720 CLC
730 RTS
740 :
750 .code
760 LDA #2
770 STA block+1
780 STA block+2
790 LDA block
800 CMP #ASC"K"
810 BEQ sdens
820 CMP #ASC"L"
830 BEQ ddens
840 CMP #ASC"Y"
850 BEQ ddens
860 CMP #ASC"Z"
870 BEQ tdens
880 CMP #ASC"*"
890 BEQ extracode
900 LDA #0
910 STA block+1
920 JMP ins
930 .extracode
940 LDA #4
950 STA block+1
960 JMP return
970 .sdens
980 LDA #ASC"*"
990 JSR input
1000 LDA #32
1010 JSR input
1020 JMP return
1030 .ddens
1040 LDA #ASC"*"
1050 JSR input
1060 LDA #33
1070 JSR input
1080 JMP return
1090 .tdens
1100 LDA #ASC"*"
1110 JSR input
1120 LDA #39
1130 JSR input
1140 JMP return
1150 .crt
1160 LDA #ASC"*"
1170 JSR input
1180 LDA #38
1190 JSR input
1200 JMP return
1210 :
1220 .code1
1230 LDA #2
1240 STA block+1
1250 LDA block
1260 CMP #0
1270 BEQ sdens
1280 CMP #1
1290 BEQ ddens
1300 CMP #2
1310 BEQ ddens
1320 CMP #3
1330 BEQ tdens
1340 CMP #4
1350 BEQ crt
1360 CMP #6
1370 BEQ crt
1380 JSR input
1390 LDA #0
1400 STA block+1
1410 JMP return
1420 .input
1430 LDX #3
1440 JSR insert
1450 RTS
1460 .length
1470 LDA block
1480 DEC block+2
1490 LDX block+2
1500 STA block+3,X
1510 JSR input
1520 LDA block+2
1530 BNE jump
1540 LDA #3
1550 STA block+1
1560 .jump
1570 JMP return
1580 .expand
1590 SEC
1600 LDA block+4
1610 SBC #1
1620 STA block+4
1630 LDA block+3
1640 SBC #0
1650 STA block+3
1660 LDA block+4
1670 CMP #255
1680 BNE triple
1690 LDA block+3
1700 CMP #255
1710 BNE triple
1720 LDA #0
1730 STA block+1
1740 LDA block
1750 JSR input
1760 JMP return
1770 .triple
1780 LDA #0
1790 STA block+5
1800 STA block+6
1810 STA block+7
1820 LDA block
1830 LDY #8
1840 .eloop
1850 CLC
1860 ROL block
1870 BCS ejump
1880 LDX #3
1890 .eloop1
1900 CLC
1910 ROL block+7
1920 ROL block+6
1930 ROL block+5
1940 DEX
1950 CPX #0
1960 BNE eloop1
1970 JMP endloop
1980 .ejump
1990 LDX #3
2000 .eloop2
2010 SEC
2020 ROL block+7
2030 ROL block+6
2040 ROL block+5
2050 DEX
2060 CPX #0
2070 BNE eloop2
2080 .endloop
2090 DEY
2100 CPY #0
2110 BNE eloop
2120 LDA block+5
2130 JSR input
2140 LDA block+6
2150 JSR input
2160 LDA block+7
2170 JSR input
2180 JMP return
2190 .block
2200 OPT FNequb(0)
2210 ]
2220 NEXT pass
2230 PROCchecksum(start
,block-start,42374)
2240 ?&22A=start MOD 25
6
2250 ?&22B=start DIV 25
6
2260 ?(block+1)=0
2270 PRINT "8 pin - 24
pin Converter now active
"
2280 END
2290 :
2300 DEF PROCchecksum(s
tart%,length%,result%)
2310 total%=0
2320 FOR byte%=start% T
O start%+length%
2330 total%=total%+?byt
e%
2340 NEXT
2350 IF total%=result%
THEN ENDPROC
2360 PRINT "Checksum er
ror."'"Please check list
ing and rerun."
2370 END
2380 :
2390 DEF FNequb(b%)
2400 ?P%=b%
2410 P%=P%+1
2420 =pass
```

Listing 4. Powers of two

```
   10 REM Powers of 2
   20 REM by Martin Hesk
eth
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 August 1988
   50 :
   60 MODE 7
   70 VDU 23,1,0;0;0;0;0
   80 start=&1900
   90 finish=&7B00
  100 FOR pass%=0 TO 3 S
TEP 3
  110 P%=&900
  120 [OPT pass%
  130 LDA #start MOD 256
  140 STA &70
  150 LDA #start DIV 256
  160 STA &71
  170 LDY #0
  180 .loop
  190 LDA #0
  200 STA (&70),Y
  210 INY
  220 CPY #0
  230 BNE loop
  240 INC &71
  250 LDA &71
  260 CMP #(finish DIV 2
56)+1
  270 BNE loop
  280 LDA #1
  290 STA finish
  300 STA &76
  310 LDA #finish DIV 25
6
  320 STA &71
  330 LDA #0
  340 STA &75
  350 STA &74
  360 STA &80
  370 STA &77
  380 STA &78
  390 .mainloop
  400 CLC
  410 LDY #0
  420 LDA (&70),Y
  430 ROL A
  440 ADC &80
  450 STA (&70),Y
  460 LDA #0
  470 STA &80
  480 LDA (&70),Y
  490 CMP #10
  500 BMI jump
  510 SEC
  520 SBC #10
  530 STA (&70),Y
  540 LDA #1
  550 STA &80
  560 .jump
  570 DEC &70
  580 LDA &70
  590 CMP #255
  600 BNE jump1
  610 DEC &71
  620 LDA &71
  630 CMP #start DIV 256
  640 BEQ end
  650 :
  660 .jump1
  670 DEC &74
  680 LDA &74
  690 CMP #255
  700 BNE mainloop
  710 DEC &75
  720 LDA &75
  730 CMP #255
  740 BNE mainloop
  750 BEQ jump2
  760 :
  770 DEC &70
  780 LDA &70
  790 BNE jump2
  800 DEC &71
  810 LDA &71
  820 CMP #start DIV 256
  830 BEQ end
  840 .jump2
  850 LDA &80
  860 BEQ jump3
  870 STA (&70),Y
  880 DEC &70
  890 LDA &70
  900 CMP #255
  910 BNE jump3
  920 DEC &71
  930 LDA &71
  940 CMP #start DIV 256
  950 BEQ end
  960 .jump3
  970 LDA #129
  980 LDX #157
  990 LDY #255
 1000 JSR &FFF4
 1010 CPX #255
 1020 BEQ print
 1030 .return
 1040 JSR up
 1050 JMP mainloop
 1060 .end
 1070 LDA #7
 1080 JSR &FFEE
 1090 RTS
 1100 .print
 1110 LDA &70
 1120 STA &72
 1130 LDA &71
 1140 STA &73
 1150 JSR header
 1160 .printloop
 1170 LDY #1
 1180 CLC
 1190 LDA (&72),Y
 1200 ADC #48
 1210 JSR &FFEE
 1220 INC &72
 1230 LDA &72
 1240 BNE printloop
 1250 INC &73
 1260 LDA &73
 1270 CMP #finish DIV 25
6
 1280 BNE printloop
 1290 LDA #13
 1300 JSR &FFE3
 1310 JSR &FFE3
 1320 JMP return
 1330 .up
 1340 SEC
 1350 LDA #(finish DIV 2
56)-1
 1360 SBC &71
 1370 STA &75
 1380 SEC
 1390 LDA #255
 1400 SBC &70
 1410 STA &74
 1420 CLC
 1430 LDA #finish DIV 25
6
 1440 STA &71
 1450 :
 1460 LDA #0
 1470 STA &70
 1480 LDA &74
 1490 ADC &80
 1500 STA &74
 1510 LDA &75
 1520 ADC #0
 1530 STA &75
 1540 LDA #0
 1550 STA &80
 1560 SED
 1570 CLC
 1580 LDA &76
 1590 ADC #1
 1600 STA &76
 1610 LDA &77
 1620 ADC #0
 1630 STA &77
 1640 LDA &78
 1650 ADC #0
 1660 STA &78
 1670 CLD
 1680 RTS
 1690 .header
 1700 LDA #ASC"2"
 1710 JSR &FFEE
 1720 LDA #32
 1730 JSR &FFEE
 1740 LDA #ASC"^"
 1750 JSR &FFEE
 1760 LDA #32
 1770 JSR &FFEE
 1780 LDX #2
 1790 .hloop
 1800 LDA &76,X
 1810 AND #&F0
 1820 LDY #4
 1830 .hloop1
 1840 LSR A
 1850 DEY
 1860 BNE hloop1
 1870 CLC
 1880 ADC #48
 1890 JSR &FFEE
 1900 LDA &76,X
 1910 AND #15
 1920 CLC
 1930 ADC #48
 1940 JSR &FFEE
 1950 DEX
 1960 CPX #255
 1970 BNE hloop
 1980 LDA #32
 1990 JSR &FFEE
 2000 LDA #ASC"="
 2010 JSR &FFEE
 2020 LDA #32
 2030 JSR &FFEE
 2040 RTS
 2050 ]
 2060 NEXT pass%
 2070 PROCchecksum(&900,
348,46547)
 2080 PRINT "Press SPACE
 to see the numbers"
 2090 CALL &900
 2100 END
 2110 :
 2120 DEF PROCchecksum(s
tart%,length%,result%)
```

Continued ►

ARC AGORA

◀ Hints & Tips listing 4 continued

```
2130 total%=0
2140 FOR byte%=start% T
O start%+length%
2150 total%=total%+?byt
e%
2160 NEXT
2170 IF total%=result%
THEN ENDPROC
2180 PRINT "Checksum er
ror."'"Please check list
ing and rerun."
2190 END
```

The easiest way to enter the listing is to buy the monthly listings disc or cassette. The disc is fully menu-driven and an excellent buy at only £5.95. The programs are also available on 3.5 inch disc for the Archimedes, Compact and Electron at £7.95. See the order form on page 101/102 for details.

The listings can also be downloaded from Micronet if you have a Micronet subscription. The *Acorn User* software can be downloaded just like any other programs from Prestel. Log on as normal and type *AU#. The charge for the software from Micronet is £5.00, so you can save money too.

See Archimedes Agora, page 48

Listing 1. Screen compacter/decompacter

```
10 REM Arc Agora - listing 1
20 REM ScreenUtils source
30 REM by David Acton
40 REM for Archimedes only
50 REM (c) Acorn User August 1988
60 :
70 MODE 3
80 DIM code% &1000
90 temp=0:size=2:byte=3:scrsize=4
100 current=5:count=6:numcol=7:pass=7
110 databits=8:datacount=9:numbits=10
120 scrst=11:sp=13:link=14:pc=15
130 FOR pass%=4 TO 6 STEP 2
140 P%=0:O%=code%
150 [OPT pass%
160 EQUD 0
170 EQUD init
180 EQUD 0
190 EQUD 0
200 EQUD title
210 EQUD help
220 EQUD commandtable
230 .title
240 FNequz("ScreenUtils")
250 .help
260 FNequz("ScreenUtils"+CHR$(9)+"1.00
("+MID$(TIME$,5,11)+")")
270 .commandtable
280 FNcom("LoadPic",ldpic,&1FF01,ldpic
syntax,ldpichelp)
290 FNcom("SavePic",svpic,&1FF01,svpic
syntax,svpichelp)
300 EQUD 0
310 .ldpicsyntax
320 FNequz("Syntax: *LoadPic <filename
>")
330 .ldpichelp
340 FNequz("*LoadPic <filename> loads
a screen saved with *SavePic.")
350 .svpicsyntax
360 FNequz("Syntax: *SavePic <filename
>")
370 .svpichelp
380 FNequz("*SavePic <filename> compac
ts and saves the current screen.")
390 :
400 .ldpic
410 STMFD (sp)!,{link}
420 LDR R12,[R12]
430 MOV R1,R0
440 MOV R0,#&40
450 SWI "OS_Find"
460 STR R0,[R12,#20]
470 MOV datacount,#1
480 BL bget
490 SWI &100+22
500 STR R0,[R12,#32]
510 SWI "OS_WriteC"
520 MOV R1,#3
530 SWI "OS_ReadModeVariable"
540 MOV numcol,R2
550 .loadpal
560 MOV current,#2
570 .loadpal2
580 SWI &100+19
590 MOV R0,numcol
600 SWI "OS_WriteC"
610 ADD R0,current,#16
620 SWI "OS_WriteC"
630 MOV R1,#24
640 BL multiread
650 STR R0,[R12,#36]
660 ADD R0,R12,#36
670 MOV R1,#3
680 SWI "OS_WriteN"
690 SUBS current,current,#1
700 BNE loadpal2
710 SUBS numcol,numcol,#1
720 BPL loadpal
730 BL initscreen
740 BL bget
750 MOV numbits,R0
760 .loadloop
770 BL bget
780 MOV current,R0
790 MOV R1,numbits
800 BL multiread
810 ADD count,R0,#1
820 .loadloop2
830 STRB current,[scrst,scrsize]
840 SUBS scrsize,scrsize,#1
850 BMI close
860 SUBS count,count,#1
870 BNE loadloop2
880 B loadloop
890 :
900 .initscreen
910 STMFD (sp)!,{link}
920 SWI "OS_RemoveCursors"
930 MOV R0,#148
940 STR R0,[R12]
950 MVN R0,#0
960 STR R0,[R12,#4]
970 MOV R0,R12
980 ADD R1,R12,#8
990 SWI "OS_ReadVduVariables"
1000 LDR R0,[R12,#32]
1010 MOV R1,#7
1020 SWI "OS_ReadModeVariable"
1030 LDR scrst,[R12,#8]
1040 SUB scrsize,R2,#1
1050 LDMFD (sp)!,{pc}
1060 :
```

Continued ▶

◄ **Arc Agora listing 1 continued**

```
1070 .svpic
1080 STMFD (sp)!,{link}
1090 LDR R12,[R12]
1100 MOV R1,R0
1110 MOV R0,#&80
1120 SWI "OS_Find"
1130 STR R0,[R12,#20]
1140 MOV datacount,#8
1150 MOV R0,#135
1160 SWI "OS_Byte"
1170 STR R2,[R12,#32]
1180 BL initscreen
1190 LDR R0,[R12,#32]
1200 BL bput
1210 LDR R0,[R12,#32]
1220 MOV R1,#3
1230 SWI "OS_ReadModeVariable"
1240 MOV numcol,R2
1250 .writepal
1260 MOV R0,numcol
1270 MOV R1,#16
1280 SWI "OS_ReadPalette"
1290 MOV R0,R3,LSR #8
1300 MOV R1,#24
1310 BL multiwrite
1320 MOV R0,R2,LSR #8
1330 MOV R1,#24
1340 BL multiwrite
1350 SUBS numcol,numcol,#1
1360 BPL writepal
1370 MOV pass,#0
1380 MOV temp,#&1000000
1390 STR temp,[R12,#28]
1400 MOV numbits,#16
1410 .savebitloop
1420 MOV size,#0
1430 BL screensub
1440 LDR temp,[R12,#28]
1450 CMP size,temp
1460 STRLT size,[R12,#28]
1470 STRLT numbits,[R12,#24]
1480 SUBS numbits,numbits,#1
1490 BNE savebitloop
1500 LDR R0,[R12,#24]
1510 BL bput
1520 LDR numbits,[R12,#24]
1530 MOV pass,#1
1540 BL screensub
1550 MOV R1,#31
1560 BL multiwrite
1570 .close
1580 SWI "OS_RestoreCursors"
1590 MOV R0,#0
1600 LDR R1,[R12,#20]
1610 SWI "OS_Find"
1620 LDMFD (sp)!,{pc}
1630 :
1640 .screensub
1650 STMFD (sp)!,{link}
1660 MOV byte,scrsize
1670 .saveloop
1680 LDRB current,[scrst,byte]
1690 MOV count,#0
1700 .sameloop
1710 LDRB temp,[scrst,byte]
1720 CMP temp,current
1730 BNE notsame
1740 ADD count,count,#1
1750 SUBS byte,byte,#1
1760 BMI save2
1770 MOV temp,#1
1780 CMP count,temp,ASL numbits
1790 BNE sameloop
1800 .notsame
1810 BL save
1820 B saveloop
1830 .save
1840 STMFD (sp)!,{link}
1850 .save2
1860 CMP pass,#0
1870 ADDEQ size,size,#8
1880 ADDEQ size,size,numbits
1890 LDMEQFD (sp)!,{pc}
1900 MOV R0,current
1910 BL bput
1920 SUB R0,count,#1
1930 MOV R1,numbits
1940 BL multiwrite
1950 LDMFD (sp)!,{pc}
1960 :
1970 .bget
1980 MOV R1,#8
1990 .multiread
2000 STMFD (sp)!,{R1,link}
2010 .multireadloop
2020 STMFD (sp)!,{R0,R1}
2030 SUBS datacount,datacount,#1
2040 BNE dontread
2050 LDR R1,[R12,#20]
2060 SWI "OS_BGet"
2070 MOV databits,R0
2080 MOV datacount,#8
2090 .dontread
2100 MOVS databits,databits,LSR #1
2110 LDMFD (sp)!,{R0,R1}
2120 MOV R0,R0,RRX
2130 SUBS R1,R1,#1
2140 BNE multireadloop
2150 LDMFD (sp)!,{R1,link}
2160 RSB R1,R1,#32
2170 MOV R0,R0,LSR R1
2180 MOV pc,link
2190 :
2200 .bput
2210 MOV R1,#8
2220 .multiwrite
2230 STMFD (sp)!,{link}
2240 .multiwriteloop
2250 MOVS R0,R0,LSR #1
2260 STMFD (sp)!,{R0,R1}
2270 MOV databits,databits,RRX
2280 SUBS datacount,datacount,#1
2290 MOVEQ datacount,#8
2300 LDREQ R1,[R12,#20]
2310 MOVEQ R0,databits,LSR #24
2320 SWIEQ "OS_BPut"
2330 LDMFD (sp)!,{R0,R1}
2340 SUBS R1,R1,#1
2350 BNE multiwriteloop
2360 LDMFD (sp)!,{pc}
2370 :
2380 .init
2390 STMFD (sp)!,{link}
2400 MOV R0,#6
2410 MOV R3,#&100
2420 SWI "OS_Module"
2430 STR R2,[R12]
2440 LDMFD (sp)!,{pc}
2450 ]:NEXT pass%
2460 save$="SAVE Scrutils "+STR$~code%+
" "+STR$~O%+" 0 0"
2470 PRINT"*"save$
2480 settype$="SETTYPE Scrutils FFA"
2490 PRINT"*"settype$
2500 OSCLI(save$)
2510 OSCLI(settype$)
```

Continued ►

◄ Arc Agora listing 1 continued

```
2520 PRINT"Module saved as 'Scrutils'"
2530 END
2540 :
2550 DEF FNequz(s$)
2560 [OPT pass%
2570 EQUS s$
2580 EQUB 0
2590 ALIGN
2600 ]:=0
2610 :
2620 DEF FNcom(com$,call,flags,syntax,help)
2630 [OPT pass%
2640 FNequz(com$)
2650 EQUD call
2660 EQUD flags
2670 EQUD syntax
2680 EQUD help
2690 ]:=0
```

Listing 2. Compacter test

```
 10 REM Arc Agora - listing 2
 20 REM Compaction test
 30 REM by David Acton
 40 REM for Archimedes only
 50 REM (c) Acorn User August 1988
 60 :
 70 MODE 15
 80 *ScrUtils
 90 FOR circ%=1 TO 1000
100 GCOL RND(64)-1 TINT (RND(4)-1)*64
110 CIRCLE FILL RND(1280)-1,RND(1024)-1,RND(100)
120 GCOL RND(64)-1 TINT (RND(4)-1)*64
130 RECTANGLE FILL RND(1280)-1,RND(1024)-1,RND(150),RND(150)
140 NEXT
150 VDU 28,18,19,61,12,12
160 PRINT "==> Help on Module ScreenUtils"'
170 PRINT "*LoadPic <filename> loads a screen saved"'"with *SavePic."''"*SavePic <filename> compacts and saves the"'"current screen."
180 *ScreenSave LargePic
190 *SavePic SmallPic
200 *LoadPic SmallPic
210 SYS "OS_File",5,"LargePic" TO ,,,,orig%
220 SYS "OS_File",5,"SmallPic" TO ,,,,new%
230 PRINT"Screen compacted to ";INT(new%/orig%*100);"%"
240 END
```

Listing 3. Directory tree lister

```
 10 REM Arc Agora - listing 3
 20 REM Tree
 30 REM by J F Button
 40 REM for Archimedes only
 50 REM (c) Acorn User August 1988
 60 :
 70 PROCinit
 80 LINE INPUT'"Start at directory: "dir$'
 90 IF dir$="" dir$="$"
100 OSCLI "dir "+dir$
110 length=FNtree
120 PRINT'"Total space used=";FNtree;" (&";~length") bytes"'
130 END
140 :
150 DEF PROCinit
160 DIM level(127),name &100
170 level=0:indent=6
180 IF MODE=7 THEN
190 topline=ASC"-"
200 vertical=ASC"!"
210 horizontal=ASC"-"
220 righttree=ASC"+"
230 bottomcorner=ASC"+"
240 ELSE
250 VDU 23,167,0,0,0,255,24,24,24,24
260 VDU 23,169,24,24,24,24,24,24,24,24
270 VDU 23,166,0,0,0,255,0,0,0,0
280 VDU 23,171,24,24,24,31,24,24,24,24
290 VDU 23,170,24,24,24,31,0,0,0,0
300 topline=167
310 vertical=169
320 horizontal=166
330 righttree=171
340 bottomcorner=170
350 ENDIF
360 space=32
370 ENDPROC
380 :
390 DEF FNtree
400 LOCAL seq,number,found,length,filelen
410 seq=0:length=0
420 REPEAT
430 SYS"OS_GBPB",8,,name,1,seq TO ,,,number,seq
440 IF number=0 THEN
450 name?(1+?name)=13
460 name$=$(name+1)
470 IF INSTR(name$," ") name$=LEFT$(name$,INSTR(name$," ")-1)
480 PROCindent(level)
490 SYS "OS_GBPB",8,,name,1,seq TO ,,,nextone
500 IF nextone THEN
510 IF level=0 AND seq=1 THEN
520 VDU horizontal
530 ELSE
540 VDU bottomcorner
550 ENDIF
560 ELSE
570 IF level=0 AND seq=1 THEN
580 VDU topline
590 ELSE
600 VDU righttree
610 ENDIF
620 ENDIF
630 SYS"OS_File",5,name$ TO found,,,,filelen
640 length+=filelen
650 PRINT STRING$(indent-1,CHR$(horizontal));name$;
660 IF found=2 THEN
670 PRINT":"
680 IF nextone THEN
690 level(level)=space
700 ELSE
```

Continued ►

JOE'S JOTTINGS

◄ Arc Agora listing 3 continued

```
710 level(level)=vertical
720 ENDIF
730 level+=1
740 OSCLI"dir "+name$
750 length+=FNtree
760 level-=1
770 *DIR ^
780 ELSE
790 PRINT
800 ENDIF
810 ENDIF
820 UNTIL number
830 IF level THEN
840 PROCindent(level)
850 PRINT"(Length=&";~length")"
860 ENDIF
870 =length
880 :
890 DEF PROCindent(level)
900 levels=0
910 WHILE levels<level
920 VDU level(levels)
930 PRINT STRING$(indent-1,CHR$space);
940 levels+=1
950 ENDWHILE
960 ENDPROC
```

Listing 4. Interrupt demonstration

```
10 REM Arc Agora - listing 4
20 REM Funny Fill
30 REM by Dave Lawrence
40 REM for Acrhimedes only
50 REM (c) Acorn User August 1988
60 :
70 MODE 13
80 VDU 23,128,1,2,4,8,16,32,64,128
90 VDU 23,129,128,64,32,16,8,4,2,1
100 PROCcode
110 SYS "XOS_Release",&10,gcol,10
120 SYS "OS_Claim",&10,gcol,10
130 REPEAT
140 CLS
150 PRINT
160 FOR pass%=1 TO 30
170 VDU 32
180 FOR J%=1 TO 38
190 VDU 127+RND(2)
200 NEXT
210 PRINT
220 NEXT
230 *FX 14,4
240 FILL 640,2
250 *FX 13,4
260 key=INKEY(200)
270 UNTIL FALSE
280 :
290 DEF PROCcode
300 DIM code% 500
310 FOR pass%=0 TO 2 STEP 2
320 P%=code%
330 [OPT pass%
340 .gcol
350 STMFD R13!,{R0,R7,R8,R9,R14}
360 LDR R7,count
370 SUBS R7,R7,#1
380 BPL nope
390 MOV R7,R12
400 MOV R9,PC
410 ORR R8,R9,#3
420 TEQP R8,#0
430 MOVNV R0,R0
440 STMFD R13!,{R14}
450 SWI &100+18
460 SWI &100+0
470 LDR R0,col
480 ADD R0,R0,#1
490 AND R0,R0,#63
500 STR R0,col
510 SWI "OS_WriteC"
520 LDMFD R13!,{R14}
530 TEQP R9,#0
540 MOVNV R0,R0
550 .nope
560 STR R7,count
570 LDMFD R13!,{R0,R7,R8,R9,PC}
580 .col
590 EQUD 0
600 .count
610 EQUD 1
620 ]:NEXT
630 ENDPROC
```

See Joe's Jottings, page 55

Listing 1. Graph plotter

```
10 REM Graphpack V1
20 REM by Joe Telford
30 REM for M/C
40 REM (c) Acorn User August 1988
50 :
60 MODE 129
70 PROCsetup
80 movetype$=""
90 CLS
100 PROCshowwindow(0)
110 PROCc1
120 COLOUR 128
130 COLOUR 2:PRINTTAB(5,0)"The Joe's J
ottings Graph Pack!";
140 COLOUR 1:PRINTTAB(10,3)"Press SPAC
E to begin"
150 REPEAT UNTIL GET=32
160 :
170 ON ERROR PROCerr
180 z%=&90A:@%=&20209
190 :
200 REPEAT
210 A%=FNmove
220 IF A%=ASC("C") THEN PROCcat
230 IF A%=ASC("S") THEN PROCsave
240 IF A%=ASC("L") THEN PROCload
250 IF A%=ASC("D") THEN PROCdelete
260 IF A%=149 THEN PROCnewsheet
270 IF A%=150 THEN PROCtitle
280 IF A%=151 THEN PROClegend
290 IF A%=152 THEN PROCdata
300 IF A%=153 THEN PROCkey
310 IF A%=154 THEN PROCdrawpi
320 IF A%=155 THEN PROCdrawbar
330 IF A%=156 THEN PROCdrawline
340 UNTIL A%=ASC("Q")
350 :
360 PROCmess("Do you really want to en
d? Y/N ")
370 REPEAT
```

Continued ►

JOE'S JOTTINGS

◄ Joe's Jottings listing 1 continued

```
  380 A$=CHR$(GET AND 223)
  390 UNTIL A$="Y" OR A$="N"
  400 IF A$="N" THEN GOTO 170
  410 *FX 4
  420 MODE 128
  430 END
  440 :
  450 DEF PROCnewsheet
  460 PROCmess("Do you really want to re
set everything? Y/N")
  470 REPEAT
  480 A$=CHR$(GET AND 223)
  490 UNTIL A$="Y" OR A$="N"
  500 IF A$="N" THEN PROCmess(""):ENDPRO
C
  510 CLEAR
  520 RUN
  530 END
  540 :
  550 DEF PROCerr
  560 VDU 3
  570 *FX 15,0
  580 VDU 7
  590 IF ERR=17 THEN movetype$="":PROCc1
:PROCmess("Last action cancelled!..Pleas
e continue."):VDU 7:A$=INKEY$(300):PROCm
ess(""):ENDPROC
  600 IF ERR=190 THEN PROCc1:PROCmess("C
an't save:cat full - change disc!"):VDU
7:A$=INKEY$(300):PROCmess(""):ENDPROC
  610 IF ERR=179 THEN PROCc1:PROCmess("C
an't save:dir full - change disc!"):VDU
7:A$=INKEY$(300):PROCmess(""):ENDPROC
  620 IF ERR=198 THEN PROCc1:PROCmess("C
an't save:disc full - change disc!"):VDU
 7:A$=INKEY$(300):PROCmess(""):ENDPROC
  630 PROCmess("")
  640 PRINT TAB(0,0);:REPORT:PRINT;ERR;"
 at line "ERL;:
  650 VDU 7
  660 A$=INKEY$(500)
  670 ENDPROC
  680 :
  690 DEF PROCcat
  700 COLOUR 3
  710 COLOUR 128
  720 CLS
  730 PRINT
  740 *DIR S
  750 *CAT
  760 *DIR $
  770 :
  780 PROCmess("files available:- ")
  790 PRINT TAB(0,1)"Press space to retu
rn"
  800 REPEAT UNTIL GET=32
  810 CLS
  820 PROCshowwindow(lxp%)
  830 PROCc1
  840 ENDPROC
  850 :
  860 DEF PROCdelete
  870 REPEAT
  880 PROCmess("delete file:- ")
  890 f$=FNgpi(7,0,cap$+low$+nos$)
  900 IF f$="" THEN PROCcat
  910 UNTIL f$>""
  920 ch%=OPENUP("S."+f$)
  930 CLOSE# ch%
  940 IF ch%=0 THEN PROCmess("Can't find
 that file."):VDU 7:A$=INKEY$(500):PROCm
ess(""):ENDPROC
  950 OSCLI("REMOVE S."+f$)
  960 OSCLI("REMOVE N."+f$)
  970 PROCmess("Deleted!")
  980 A$=INKEY$(300)
  990 PROCmess("")
 1000 ENDPROC
 1010 :
 1020 DEF PROCsave
 1030 REPEAT
 1040 PROCmess("Save as filename:- ")
 1050 f$=FNgpi(7,0,cap$+low$+nos$)
 1060 IF f$="" THEN PROCcat
 1070 UNTIL f$>""
 1080 ch%=OPENUP("S."+f$)
 1090 IF ch%<>0 THEN CLOSE# ch%:PROCmess
("That file exists"):VDU 7:A$=INKEY$(500
):PROCmess(""):ENDPROC
 1100 ch%=OPENOUT("S."+f$)
 1110 PROCmess("Saving..... please wait"
)
 1120 FOR x=0 TO max
 1130 FOR y=0 TO max
 1140 PRINT# ch%,A$(x,y)
 1150 NEXT
 1160 NEXT
 1170 CLOSE# ch%
 1180 ch%=OPENOUT("N."+f$)
 1190 FOR x=0 TO max
 1200 FOR y=0 TO max
 1210 PRINT# ch%,A(x,y)
 1220 NEXT
 1230 NEXT
 1240 CLOSE# ch%
 1250 PROCmess("Saved!")
 1260 A$=INKEY$(300)
 1270 PROCmess("")
 1280 ENDPROC
 1290 :
 1300 DEF PROCload
 1310 REPEAT
 1320 PROCmess("load filename:- ")
 1330 f$=FNgpi(7,0,cap$+low$+nos$)
 1340 IF f$="" THEN PROCcat
 1350 UNTIL f$>""
 1360 ch%=OPENUP("S."+f$)
 1370 IF ch%=0 THEN CLOSE# ch%:PROCmess(
"Can't find that file."):VDU 7:A$=INKEY$
(500):PROCmess(""):ENDPROC
 1380 PROCmess("Loading..... please wait
")
 1390 FOR x=0 TO max
 1400 FOR y=0 TO max
 1410 INPUT# ch%,A$(x,y)
 1420 NEXT
 1430 NEXT
 1440 CLOSE# ch%
 1450 ch%=OPENUP("N."+f$)
 1460 FOR x=0 TO max
 1470 FOR y=0 TO max
 1480 INPUT# ch%,A(x,y)
 1490 NEXT
 1500 NEXT
 1510 CLOSE# ch%
 1520 xp%=0:yp%=0
 1530 lxp%=0
 1540 PROCshowwindow(0)
 1550 PROCc1
 1560 ENDPROC
 1570 :
 1580 DEF PROCbmess(t$)
 1590 COLOUR 2
 1600 COLOUR 128
 1610 PRINT TAB(0,31);STRING$(39," ");
 1620 PRINT TAB(0,31);t$;
 1630 ENDPROC
 1640 :
```

Continued ►

JOE'S JOTTINGS

◀ Joe's Jottings listing 1 continued

```
1650 DEF PROCprintit(sx,ex,ey)
1660 *FX 3,10
1670 VDU 2,1,15
1680 PRINT
1690 PRINT "--";
1700 FOR x=sx TO ex
1710 PRINT "|-";LEFT$(col$(x),8);
1720 NEXT
1730 PRINT
1740 FOR y=0 TO yend
1750 VDU 1,15
1760 IF y<10 PRINT " ";
1770 @%=z%
1780 PRINT ;y;
1790 @%=&20209
1800 FOR x=sx TO ex
1810 PRINT colchar$;
1820 IF LEFT$(A$(x,y),1)<>CHR$34 THEN P
RINT A(x,y);:GOTO 1850
1830 IF A$(x,y)=CHR$34 THEN PRINT SPC(9
);:GOTO 1850
1840 IF A$(x,y)>CHR$34 THEN PRINT MID$(
A$(x,y),2,LENA$(x,y));SPC(10-LEN(A$(x,y)
)); ELSE PRINT A(x,y);
1850 NEXT
1860 PRINT
1870 NEXT
1880 VDU 3
1890 *FX 3,4
1900 ENDPROC
1910 :
1920 DEF PROCmess(t$)
1930 COLOUR 128
1940 COLOUR 3
1950 PRINT TAB(0,0);STRING$(200," ");
1960 PRINT TAB(0,0);t$;
1970 ENDPROC
1980 :
1990 DEF PROCshowwindow(nxp%)
2000 COLOUR 3
2010 COLOUR 128
2020 PROCdrawaxes(nxp%*4,0)
2030 PROCdrawwindow(nxp%*4,0)
2040 ENDPROC
2050 :
2060 DEF PROCdrawaxes(x,y)
2070 PRINT TAB(0,5);"JJ*|";
2080 FOR loop%=x TO x+3
2090 PRINT col$(loop%);
2100 NEXT
2110 FOR loop%=y TO y+24
2120 PRINT TAB(0,loop%-y+6);row$(loop%)
2130 NEXT
2140 PROCrcmess
2150 ENDPROC
2160 :
2170 DEF PROCrcmess
2180 IF recalcflag=0 PROCbmess("Manual
Recalc"):ELSE PROCbmess("Auto Recalc")
2190 ENDPROC
2200 :
2210 DEF PROCdrawwindow(x,y)
2220 LOCAL y1%,x1%,d$
2230 VDU 28,4,30,39,6,12,26
2240 COLOUR 128
2250 FOR y1%=0 TO 24
2260 FOR x1%=0 TO 3
2270 PRINT TAB(4+x1%*9,y1%+6);
2280 IF LEFT$(A$(x+x1%,y1%),1)=CHR$34 T
HEN COLOUR 3:PRINT MID$(A$(x+x1%,y1%),2,
9);:NEXT:NEXT:ENDPROC
2290 IF LEFT$(A$(x+x1%,y1%),1)<>CHR$34
AND A$(x+x1%,y1%)>"" THEN COLOUR 2:ELSE
COLOUR 1
2300 PRINT A(x+x1%,y1%);
2310 NEXT
2320 NEXT
2330 ENDPROC
2340 :
2350 DEF PROCc1
2360 COLOUR 0
2370 IF LEFT$(A$(xp%,yp%),1)=CHR$(34) T
HEN COLOUR 131:PRINT TAB((xp% MOD 4)*9+4
,yp%+6);SPC(9);TAB((xp% MOD 4)*9+4,yp%+6
);MID$(A$(xp%,yp%),2,9);:ENDPROC
2380 IF LEFT$(A$(xp%,yp%),1)<>CHR$34 AN
D A$(xp%,yp%)>"" THEN COLOUR 130:PRINT T
AB((xp% MOD 4)*9+4,yp%+6);SPC(9);TAB((xp
% MOD 4)*9+4,yp%+6)A(xp%,yp%);:ENDPROC
2390 COLOUR 129
2400 PRINT TAB((xp% MOD 4)*9+4,yp%+6);S
PC(9);TAB((xp% MOD 4)*9+4,yp%+6)A(xp%,yp
%);
2410 ENDPROC
2420 :
2430 DEF PROCc2
2440 COLOUR 128:PRINT TAB((xp% MOD 4)*9
+4,yp%+6);SPC(9);
2450 PRINT TAB((xp% MOD 4)*9+4,yp%+6);
2460 IF LEFT$(A$(xp%,yp%),1)=CHR$34 THE
N COLOUR 3:PRINT MID$(A$(xp%,yp%),2,9);:
ENDPROC
2470 IF LEFT$(A$(xp%,yp%),1)<>CHR$34 AN
D A$(xp%,yp%)>"" THEN COLOUR 2:ELSE COLO
UR 1
2480 PRINT A(xp%,yp%);
2490 ENDPROC
2500 :
2510 DEF FNmove
2520 *FX 4,1
2530 IF movetype$="" THEN PROCfshow
2540 A%=GET
2550 B%=1
2560 IF INKEY-1 THEN B%=2
2570 IF INKEY-2 THEN B%=3
2580 PROCc2
2590 IF A%=139 THEN PROCup(B%)
2600 IF A%=138 THEN PROCdown(B%)
2610 IF A%=136 THEN PROCleft(B%)
2620 IF A%=137 THEN PROCright(B%)
2630 PROCc1
2640 =A%
2650 :
2660 DEF PROCfshow
2670 IF LEFT$(A$(xp%,yp%),1)<>CHR$34 AN
D A$(xp%,yp%)>"" THEN PROCmess("Formula
:= "+A$(xp%,yp%)):ELSE PROCmess("")
2680 ENDPROC
2690 :
2700 DEF PROCup(b)
2710 IF b=3 THEN yp%=0:ENDPROC
2720 IF b=2 THEN yp%=yp%-4 ELSE yp%=yp%
-1
2730 IF yp%<0 THEN yp%=0
2740 ENDPROC
2750 :
2760 DEF PROCdown(b)
2770 IF b=3 THEN yp%=max:ENDPROC
2780 IF b=2 THEN yp%=yp%+4 ELSE yp%=yp%
+1
2790 IF yp%>max THEN yp%=max
2800 ENDPROC
2810 :
2820 DEF PROCleft(b)
2830 IF b=3 THEN xp%=0:nxp%=0
2840 IF (b=3) AND (1xp%=nxp%) THEN ENDP
ROC
2850 IF (b=3) AND (1xp%<>nxp%) PROCshow
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
window(nxp%):lxp%=nxp%:ENDPROC
 2860 IF b=2 THEN xp%=xp%-4:ELSE xp%=xp%
-1
 2870 IF xp%<0 THEN xp%=0
 2880 nxp%=(xp% DIV 4)
 2890 IF lxp%=nxp% THEN ENDPROC
 2900 PROCshowwindow(nxp%)
 2910 lxp%=nxp%
 2920 ENDPROC
 2930 :
 2940 DEF PROCright(b)
 2950 IF b=3 THEN xp%=max:nxp%=xp% DIV 4
 2960 IF (b=3) AND (lxp%=nxp%) THEN ENDP
ROC
 2970 IF (b=3) AND (lxp%<>nxp%) PROCshow
window(nxp%):lxp%=nxp%:ENDPROC
 2980 IF b=2 THEN xp%=xp%+4 ELSE xp%=xp%
+1
 2990 IF xp%>max THEN xp%=max
 3000 nxp%=(xp% DIV 4)
 3010 IF lxp%=nxp% THEN ENDPROC
 3020 PROCshowwindow(nxp%)
 3030 lxp%=nxp%
 3040 ENDPROC
 3050 :
 3060 DEF FNgpi(len,effect,valid$)
 3070 LOCAL a$,b
 3080 a$=""
 3090 PRINT STRING$(len,".");STRING$(len
,CHR$(8));
 3100 *FX 20,1
 3110 b=GET
 3120 IF b=13 THEN =a$
 3130 IF b=127 AND a$="" THEN 3110
 3140 IF b=127 a$=LEFT$(a$,LEN(a$)-1):PR
INT CHR$b;".";CHR$(8);:GOTO 3110
 3150 IF effect=0 THEN 3180
 3160 IF effect=1 b=b AND 223 ELSE b=b O
R 32
 3170 IF effect=3 AND(RIGHT$(a$,1)=" " O
R a$="") b=b AND 223
 3180 IF LEN(a$)=len OR INSTR(valid$,CHR
$b)=0 VDU 7:GOTO 3110
 3190 PRINT CHR$b;
 3200 a$=a$+CHR$b
 3210 GOTO 3110
 3220 :
 3230 DEF PROCvalid
 3240 cap$=" ABCDEFGHIJKLMNOPQRSTUVWXYZ"
 3250 low$=" abcdefghijklmnopqrstuvwxyz"
 3260 nos$="-.0123456789"
 3270 pun$=" _^[]}{!#$%&'()=?/*:+;.,<>"+
CHR$34
 3280 all$=cap$+low$+nos$+pun$
 3290 ENDPROC
 3300 :
 3310 DEF PROCsetup
 3320 max=24
 3330 DIM A$(max+4,max),col$(max+4),row$
(max),A(max,max)
 3340 DIM title$(3)
 3350 FOR xloop%=0 TO max+4
 3360 FOR yloop%=0 TO max
 3370 A$(xloop%,yloop%)=CHR$(34)
 3380 NEXT
 3390 NEXT
 3400 FOR loop%=0 TO 9
 3410 col$(loop%)="-Col  "+STR$(loop%)+"-
-|"
 3420 NEXT
 3430 FOR loop%=10 TO max+4
 3440 col$(loop%)="-Col  "+STR$(loop%)+"-
|"
 3450 NEXT
 3460 FOR loop%=0 TO 9
 3470 row$(loop%)=".."+STR$(loop%)+"|"
 3480 NEXT
 3490 FOR loop%=10 TO max
 3500 row$(loop%)="."+STR$(loop%)+"|"
 3510 NEXT
 3520 :
 3530 xp%=0:yp%=0
 3540 xmax%=0:ymax%=0:lxp%=0
 3550 lsx%=0:lsy%=0
 3560 lex%=0:ley%=0
 3570 :
 3580 DIM dsx%(2),dex%(2),dey%(2),dsy%(2
)
 3590 dsx%(1)=0:dsy%(1)=0:dex%(1)=0:dey%
(1)=0
 3600 dsx%(2)=0:dsy%(2)=0:dex%(2)=0:dey%
(2)=0
 3610 z%=@%:@%=&20209
 3620 recalcflag=FALSE
 3630 *KEY 0 T
 3640 *KEY 1 N
 3650 *KEY 2 F
 3660 *KEY 3 R
 3670 *KEY 4 C
 3680 *KEY 5 S
 3690 *KEY 6 L
 3700 *KEY 7 D
 3710 *KEY 8 P
 3720 *KEY 9 Q
 3730 *FX 226,140
 3740 *FX 227,150
 3750 PROCvalid
 3760 DIM max(2),r(2),c(2),min(2),total(
2)
 3770 DIM legend$(24),data(2,24),items(2
)
 3780 items(1)=0:items(2)=0
 3790 DIM key$(2)
 3800 ENDPROC
 3810 :
 3820 DEF PROCdumpout
 3830 DIM P%3,Q%3
 3840 !P%=&03010000
 3850 !Q%=&03020100
 3860 MOVE 0,0
 3870 VDU 29,0;0;2,1,27,1,65,1,8,1,10
 3880 FOR Y%=1020 TO 12 STEP-16
 3890 VDU 1,27,1,76,1,192,1,3
 3900 FOR X%=0 TO 1276 STEP 4
 3910 A%=0:B%=0
 3920 FOR Z%=0 TO 12 STEP 4
 3930 C%=POINT(X%,Y%-Z%)
 3940 A%=A%*4+P%?C%
 3950 B%=B%*4+Q%?C%
 3960 NEXT
 3970 VDU 1,A%,1,B%,1,A%
 3980 NEXT
 3990 VDU 1,10
 4000 NEXT
 4010 VDU 1,27,1,64,3
 4020 ENDPROC
 4030 :
 4040 DEF PROCtitle
 4050 LOCAL loop%
 4060 REPEAT
 4070 PROCmess("Please enter upto 3 titl
e lines:")
 4080 FOR loop%=1 TO 3
 4090 @%=z%
 4100 PRINT TAB(0,loop%);loop%;":";
 4110 @%=&20209
 4120 title$(loop%)=FNgpi(38,0,all$)
 4130 NEXT
```

Continued ▶

◀ **Joe's Jottings listing 1 continued**

```
 4140 PRINT TAB(0,4);"Is this O.K? (Y/N)
 ";
 4150 ok$=CHR$(GET AND 223)
 4160 UNTIL ok$="Y"
 4170 PROCmess("")
 4180 ENDPROC
 4190 :
 4200 DEF PROClegend
 4210 movetype$="T"
 4220 lsx%=0:lsy%=0
 4230 lex%=0:ley%=0
 4240 PROCmess("Start legend:")
 4250 PRINT TAB(0,1);"Move to start of r
ow/column"
 4260 PRINT "then press RETURN.";
 4270 REPEAT
 4280 A%=FNmove
 4290 UNTIL A%=13
 4300 lsx%=xp%:lsy%=yp%
 4310 PROCmess("End legend:")
 4320 PRINT TAB(0,1);"Move to end of row
/column"
 4330 PRINT "then press RETURN.";
 4340 REPEAT
 4350 A%=FNmove
 4360 UNTIL A%=13
 4370 lex%=xp%:ley%=yp%
 4380 IF lsx%>lex% THEN sp=lsx%:lsx%=lex
%:lex%=sp
 4390 IF lsy%>ley% THEN sp=lsy%:lsy%=ley
%:ley%=sp
 4400 lr=lex%-lsx%
 4410 lc=ley%-lsy%
 4420 IF lr=0 AND lc=0 PROCmess("Legend
can't be 1 slot: Reselect!"):VDU 7:A$=IN
KEY$(300):PROCmess(""):ENDPROC
 4430 IF lr<>0 AND lc<>0 PROCmess("Legen
d can't have rows & cols: Reselect!"):VD
U 7:A$=INKEY$(300):PROCmess(""):ENDPROC
 4440 IF lr=0 THEN PROCcopycols ELSE PRO
Ccopyrows
 4450 PROCmess("Legend selected")
 4460 A$=INKEY$(200)
 4470 PROCmess("")
 4480 movetype$=""
 4490 ENDPROC
 4500 :
 4510 DEF PROCcopycols
 4520 LOCAL loop%
 4530 FOR loop%=lsy% TO ley%
 4540 legend$(loop%-lsy%)=MID$(A$(lsx%,l
oop%),2,9)
 4550 IF A$(lsx%,loop%)=CHR$34 OR LEFT$(
A$(lsx%,loop%),1)<>CHR$(34) THEN legend$
(loop%-lsy%)=STR$(A(lsx%,loop%))
 4560 NEXT
 4570 ENDPROC
 4580 :
 4590 DEF PROCcopyrows
 4600 LOCAL loop%
 4610 FOR loop%=lsx% TO lex%
 4620 legend$(loop%-lsx%)=MID$(A$(loop%,
lsy%),2,9)
 4630 IF A$(loop%,lsy%)=CHR$34 OR LEFT$(
A$(loop%,lsx%),1)<>CHR$(34) THEN legend$
(loop%-lsx%)=STR$(A(loop%,lsy%))
 4640 NEXT
 4650 ENDPROC
 4660 :
 4670 DEF PROCkey
 4680 LOCAL A$,gr
 4690 movetype$="T"
 4700 PROCmess("Key for graph 1 or 2? ")
 4710 REPEAT
 4720 A$=GET$
 4730 UNTIL A$="1" OR A$="2"
 4740 gr=VALA$
 4750 PROCmess("Key: ")
 4760 PRINT TAB(0,1);"Move to slot with
key for Graph "+A$
 4770 PRINT "then press RETURN.";
 4780 REPEAT A%=FNmove
 4790 UNTIL A%=13
 4800 key$(gr)=MID$(A$(xp%,yp%),2,9)
 4810 PROCmess("Key for graph "+A$+" sel
ected")
 4820 A$=INKEY$(200)
 4830 PROCmess("")
 4840 movetype$=""
 4850 ENDPROC
 4860 :
 4870 DEF PROCdata
 4880 movetype$="T"
 4890 PROCmess("Is this data for graph 1
 or 2? ")
 4900 REPEAT
 4910 A$=GET$
 4920 UNTIL A$="1" OR A$="2"
 4930 PRINT A$
 4940 gr=VALA$
 4950 PROCmess("Start Data:")
 4960 PRINT TAB(0,1);"Move to start of r
ow/column"
 4970 PRINT "then press RETURN.";
 4980 REPEAT
 4990 A%=FNmove
 5000 UNTIL A%=13
 5010 dsx%(gr)=xp%:dsy%(gr)=yp%
 5020 PROCmess("End Data:")
 5030 PRINT TAB(0,1);"Move to end of row
/column"
 5040 PRINT "then press RETURN.";
 5050 REPEAT A%=FNmove
 5060 UNTIL A%=13
 5070 dex%(gr)=xp%
 5080 dey%(gr)=yp%
 5090 IF dsx%(gr)>dex%(gr) THEN sp=dsx%(
gr):dsx%(gr)=dex%(gr):dex%(gr)=sp
 5100 IF dsy%(gr)>dey%(gr) THEN sp=dsy%(
gr):dsy%(gr)=dey%(gr):dey%(gr)=sp
 5110 r(gr)=dex%(gr)-dsx%(gr)
 5120 c(gr)=dey%(gr)-dsy%(gr)
 5130 IF r(gr)=0 AND c(gr)=0 PROCmess("D
ata can't be 1 slot: Reselect!"):VDU 7:A
$=INKEY$(300):PROCmess(""):ENDPROC
 5140 IF r(gr)<>0 AND c(gr)<>0 PROCmess(
"Data can't be rows & cols: Reselect!"):
VDU 7:A$=INKEY$(300):PROCmess(""):ENDPRO
C
 5150 IF r(gr)=0 THEN PROCcdcols(gr) ELS
E PROCcdrows(gr)
 5160 PROCmess("Data for graph "+STR$(gr
)+" selected")
 5170 A$=INKEY$(200)
 5180 PROCmess("")
 5190 movetype$=""
 5200 ENDPROC
 5210 :
 5220 DEF PROCcdcols(g)
 5230 LOCAL loop%
 5240 FOR loop%=dsy%(g) TO dey%(g)
 5250 data(g,loop%-dsy%(g))=A(dsx%(g),lo
op%)
 5260 items(g)=c(g)
 5270 NEXT
 5280 ENDPROC
 5290 :
 5300 DEF PROCcdrows(g)
```

Continued ▶

◄ Joe's Jottings listing 1 continued

```
5310 LOCAL loop%
5320 FOR loop%=dsx%(g) TO dex%(g)
5330 data(g,loop%-dsx%(g))=A(loop%,dsy%(g))
5340 items(g)=r(g)
5350 NEXT
5360 ENDPROC
5370 :
5380 DEF PROCdrawbar
5390 gr$=FNdrawwhat
5400 PROCsort(gr$)
5410 IF LEFT$(max$,1)="D" THEN PROCmess(max$):VDU 7:A$=INKEY$(200):ENDPROC
5420 IF gr$="B" AND (items(1)<>items(2)) PROCmess("Rows/cols of data must be same length"):VDU 7:A$=INKEY$(300):ENDPROC
5430 IF gr$="B" AND (r(1)<>r(2) OR c(1)<>c(2)) THEN PROCmess("Both graphs must be of columns"+CHR$(10)+CHR$(13)+"or both must be of rows and"+CHR$10+CHR$(13)+"both sets of data must be of equal size"):VDU 7:A$=INKEY$(300):ENDPROC
5440 IF maxr-minr=0 THEN PROCmess("Data missing for this graph - reselect!"):A$=INKEY$(200):ENDPROC
5450 CLS
5460 PROCaxis
5470 PROCptitle
5480 IF gr$="1" OR gr$="B" THEN PROCbar(1)
5490 IF gr$="2" OR gr$="B" THEN PROCbar(2)
5500 PROCcheckprintout
5510 CLS
5520 xp%=0:yp%=0
5530 lxp%=0
5540 PROCshowwindow(0)
5550 PROCc1
5560 ENDPROC
5570 :
5580 DEF PROCbar(g)
5590 COLOUR g+1
5600 PRINT TAB(31,4+g);key$(g);
5610 GCOL 0,g+1
5620 LOCAL loop%
5630 FOR loop%=0 TO items(g)
5640 PROCrect(128+(xscale/2)*(g-1)+loop%*xscale,64-minr*yscale,xscale/2,data(g,loop%)*yscale,1)
5650 NEXT
5660 ENDPROC
5670 :
5680 DEF PROCcheckprintout
5690 REPEAT
5700 PRINT TAB(0,31)"P";
5710 A$=INKEY$(30)
5720 PRINT TAB(0,31)" ";
5730 IF A$="P" THEN PRINT TAB(0,31)"*";:PROCdumpout:UNTIL 0
5740 IF A$>"" THEN 5770
5750 A$=INKEY$(30)
5760 IF A$="P" THEN PRINT TAB(0,31)"*";:PROCdumpout:UNTIL 0
5770 UNTIL A$>""
5780 ENDPROC
5790 :
5800 DEF PROCdrawline
5810 gr$=FNdrawwhat
5820 PROCsort(gr$)
5830 IF LEFT$(max$,1)="D" THEN PROCmess(max$):VDU 7:A$=INKEY$(200):ENDPROC
5840 IF gr$="B" AND (r(1)<>r(2) OR c(1)<>c(2)) THEN PROCmess("Both graphs must be of columns"+CHR$(10)+CHR$(13)+"or both must be of rows"):VDU 7:A$=INKEY$(300):ENDPROC
5850 IF gr$="B" AND (items(1)<>items(2)) PROCmess("Rows/cols of data must be same length"):VDU 7:A$=INKEY$(300):ENDPROC
5860 IF maxr-minr = 0 THEN PROCmess("Data missing for this graph - reselect!"):A$=INKEY$(200):ENDPROC
5870 CLS
5880 PROCaxis
5890 PROCptitle
5900 IF gr$="1" OR gr$="B" THEN PROCline(1)
5910 IF gr$="2" OR gr$="B" THEN PROCline(2)
5920 PROCcheckprintout
5930 CLS
5940 xp%=0:yp%=0
5950 lxp%=0
5960 PROCshowwindow(0)
5970 PROCc1
5980 ENDPROC
5990 :
6000 DEF PROCline(g)
6010 COLOUR g+1
6020 PRINT TAB(31,4+g);key$(g);
6030 GCOL 0,g+1
6040 LOCAL loop%
6050 MOVE 128,(64-minr*yscale)+data(g,0)*yscale
6060 FOR loop%=1 TO items(g)
6070 DRAW 128+loop%*xscale,(64-minr*yscale)+data(g,loop%)*yscale
6080 NEXT
6090 ENDPROC
6100 :
6110 DEF PROCdrawpi
6120 gr$=FNdrawwhat
6130 PROCsort(gr$)
6140 IF LEFT$(max$,1)="D" THEN PROCmess(max$):VDU 7:A$=INKEY$(200):ENDPROC
6150 IF gr$="B" AND (r(1)<>r(2) OR c(1)<>c(2)) THEN PROCmess("Both graphs must be of columns"+CHR$(10)+CHR$(13)+"or both must be of rows"):VDU 7:A$=INKEY$(300):ENDPROC
6160 IF maxr-minr=0 THEN PROCmess("Data missing for this graph - reselect!"):A$=INKEY$(200):ENDPROC
6170 CLS
6180 PROCptitle
6190 IF gr$="1" OR gr$="B" THEN PROCpi(1)
6200 IF gr$="2" OR gr$="B" THEN PROCpi(2)
6210 PROCcheckprintout
6220 CLS
6230 xp%=0:yp%=0
6240 lxp%=0
6250 PROCshowwindow(0)
6260 PROCc1
6270 ENDPROC
6280 :
6290 DEF PROCpi(g)
6300 LOCAL loop%,angle,lastangle,centre
6310 centre=320+600*(g-1)
6320 lastangle=90
6330 FOR loop%=0 TO items(g)
6340 MOVE centre,500
6350 MOVE centre+290*COS(RAD(lastangle)),500+290*SIN(RAD(lastangle))
6360 angle=lastangle+ABS(data(g,loop%))*360/total(g)
6370 PROCef(loop%)
```

Continued ►

◀ **Joe's Jottings listing 1 continued**

```
6380 PLOT 181,centre+290*COS(RAD(angle)),500+290*SIN(RAD(angle))
6390 lastangle=angle
6400 NEXT
6410 GCOL 0,1
6420 MOVE centre,500
6430 PLOT 149,centre,794
6440 COLOUR g+1
6450 PRINT TAB(5+20*(g-1),27);key$(g);
6460 ENDPROC
6470 :
6480 DEF PROCef(c)
6490 IF INT(c/20)*20=c THEN RESTORE
6500 LOCAL loop%
6510 VDU 23
6520 FOR loop%=0 TO 8
6530 READ d
6540 VDU d
6550 NEXT
6560 GCOL 16*(c DIV 4),c MOD 4
6570 ENDPROC
6580 :
6590 DATA 12,0,0,0,0,0,0,0,0
6600 DATA 12,1,1,1,1,1,1,1,1
6610 DATA 12,2,2,2,2,2,2,2,2
6620 DATA 12,3,3,3,3,3,3,3,3
6630 :
6640 DATA 12,0,1,0,1,0,1,0,1
6650 DATA 12,0,2,0,2,0,2,0,2
6660 DATA 12,0,3,0,3,0,3,0,3
6670 DATA 12,0,1,1,0,0,1,1,0
6680 :
6690 DATA 13,0,2,2,0,0,2,2,0
6700 DATA 13,0,3,3,0,0,3,3,0
6710 DATA 13,1,2,1,2,1,2,1,2
6720 DATA 13,1,3,1,3,1,3,1,3
6730 :
6740 DATA 14,1,2,2,1,1,2,2,1
6750 DATA 14,1,3,3,1,1,3,3,1
6760 DATA 14,2,3,2,3,2,3,2,3
6770 DATA 14,2,3,3,2,2,3,3,2
6780 :
6790 DATA 15,0,0,1,1,0,0,1,1
6800 DATA 15,0,0,2,2,0,0,2,2
6810 DATA 15,0,0,3,3,0,0,3,3
6820 DATA 15,2,2,1,1,2,2,1,1
6830 :
6840 DEF FNdrawwhat
6850 LOCAL A$
6860 PROCmess("Draw Graph 1, 2, or both? (1/2/B)")
6870 REPEAT
6880 A$=GET$
6890 UNTIL INSTR("12B",A$)>0
6900 PRINT A$
6910 =A$
6920 :
6930 DEF PROCsort(g$)
6940 max$=""
6950 max(1)=0
6960 max(2)=0
6970 min(1)=9999
6980 min(2)=9999
6990 IF g$="1" OR g$="B" PROCmax(1)
7000 IF g$="2" OR g$="B" PROCmax(2)
7010 IF max$<>"" THEN ENDPROC
7020 maxr=max(2)
7030 IF max(1)>max(2) THEN maxr=max(1)
7040 minr=min(2)
7050 IF min(1)<min(2) THEN minr=min(1)
7060 ENDPROC
7070 :
7080 DEF PROCmax(n)
7090 total(n)=0
7100 FOR lp=0 TO items(n)
7110 IF data(n,lp)>max(n) THEN max(n)=data(n,lp)
7120 IF data(n,lp)<min(n) THEN min(n)=data(n,lp)
7130 total(n)=total(n)+ABS(data(n,lp))
7140 NEXT
7150 ENDPROC
7160 :
7170 DEF PROCptitle
7180 LOCAL loop%
7190 FOR loop%=1 TO 3
7200 PRINT TAB(20-LEN(title$(loop%))/2,loop%-1);title$(loop%)
7210 NEXT
7220 ENDPROC
7230 :
7240 DEF PROCaxis
7250 GCOL 0,1
7260 PROCrect(128,64,1024,832,0)
7270 IF minr>0 THEN minr=0
7280 yscale=832/(maxr-minr)
7290 FOR y=64 TO 896 STEP 64
7300 @%=z%
7310 MOVE 1152,y:DRAW 100,y:MOVE 0,y+16
7320 yval=INT(((y-64)/yscale)*10+.5+minr*10)/10
7330 VDU 5
7340 IF yval<10 AND yval>-10 THEN PRINT ;yval:ELSE PRINT ;INT(yval)
7350 VDU 4
7360 @%=&20209
7370 NEXT
7380 GCOL 0,3
7390 MOVE 100,64-minr*yscale
7400 DRAW 1180,64-minr*yscale
7410 GCOL 0,1
7420 IF (gr$="1" OR gr$="B") AND c(1)=0 THEN items=r(1)
7430 IF (gr$="1" OR gr$="B") AND r(1)=0 THEN items=c(1)
7440 IF (gr$="2" OR gr$="B") AND r(2)=0 THEN items=c(2)
7450 IF (gr$="2" OR gr$="B") AND c(2)=0 THEN items=r(2)
7460 xscale=1024/(items+1)
7470 FOR x=128 TO 1152 STEP xscale
7480 @%=z%
7490 MOVE x,48
7500 VDU 5
7510 PRINT LEFT$(legend$((x-128)DIV xscale),xscale/32);
7520 VDU 4
7530 @%=&20209
7540 MOVE x,48
7550 DRAW x,896
7560 NEXT
7570 ENDPROC
7580 :
7590 DEF PROCrect(x,y,l,w,f)
7600 MOVE x,y
7610 DRAW x+l,y
7620 IF f=0 DRAW x+l,y+w ELSE PLOT 85,x,y+w
7630 IF f=0 DRAW x,y+w ELSE PLOT 85,x+l,y+w
7640 MOVE x,y+w
7650 IF f=0 DRAW x,y ELSE MOVE x,y
7660 ENDPROC
```

See Network Page, page 129

Listing 1. Teletext fileserver source code

```
10 REM Teletext Fileserver source code
20 REM by Alistair Shimmin
30 REM for B/B+/M/C
40 REM (c) Acorn User August 1988
50 :
60 vers$="Vers 2.0"
70 broadcasttime=50
80 osword=&FFF1
90 osbyte=&FFF4
100 oswrch=&FFEE
110 page=&70
120 copybase=&72
130 copy40base=&74
140 subpage=&76
150 checkstring=&78
160 copy=&7A
170 copy40=&7C
180 code%=&900
190 :
200 PROCclearmem
210 PROCassemble
220 PROCchecksum
230 PROCoscli("SAVE code 900 "+STR$~(end)+" "+STR$~(init OR &FFFF0000)+" FFFF0900")
240 END
250 :
260 DEF PROCassemble
270 FOR pass=0 TO 3 STEP 3
280 P%=code%
290 [OPT pass
300 PHP
310 CMP #5
320 BNE notourevent
330 PHA
340 TYA
350 PHA
360 TXA
370 PHA
380 JSR shiftbcast
390 LDA #0
400 STA chan
410 LDX #chan MOD 256
420 LDY #chan DIV 256
430 LDA #&7A
440 JSR osword
450 LDA chan+1
460 ORA #48
470 STA header
480 INC header
490 LDA &7C0F
500 STA header+1
510 LDA &7C10
520 STA header+2
530 LDA &7C11
540 STA header+3
550 LDX #bcast MOD 256
560 LDY #bcast DIV 256
570 LDA #&10
580 JSR osword
590 JSR setintervaltimer
600 PLA
610 TAX
620 PLA
630 TAY
640 PLA
650 .notourevent
660 PLP
670 JMP (oldeventvector)
680 .oldeventvector
690 OPT FNequw(0)
700 .olduservector
710 OPT FNequw(0)
720 .chan
730 OPT FNequw(0)
740 .shiftbcast
750 LDX #11
760 .loop
770 LDA bcaststore,X
780 STA bcast,X
790 DEX
800 BPL loop
810 RTS
820 .bcaststore
830 OPT FNequd(&FFFFB580)
840 OPT FNequd(0)
850 OPT FNequd(0)
860 .bcast
870 OPT FNequd(0)
880 .header
890 OPT FNequd(0)
900 OPT FNequd(0)
910 .time
920 OPT FNequd(-broadcasttime)
930 OPT FNequb(&FF)
940 .setintervaltimer
950 LDX #time MOD 256
960 LDY #time DIV 256
970 LDA #4
980 JMP osword
990 .init
1000 LDA &220
1010 STA oldeventvector
1020 LDA &221
1030 STA oldeventvector+1
1040 LDA &200
1050 STA olduservector
1060 LDA &201
1070 STA olduservector+1
1080 LDA #decode MOD 256
1090 STA &200
1100 LDA #decode DIV 256
1110 STA &201
1120 JSR setintervaltimer
1130 SEI
1140 LDA #code% MOD 256
1150 STA &220
1160 LDA #code% DIV 256
1170 STA &221
1180 CLI
1190 LDA #14
1200 LDX #5
1210 JMP osbyte
1220 .setpointers
1230 LDA copybase
1240 STA copy
1250 LDA copybase+1
1260 STA copy+1
1270 LDA copy40base
1280 STA copy40
1290 LDA copy40base+1
1300 STA copy40+1
1310 RTS
1320 .notourosword
1330 PLP
1340 JMP (olduservector)
1350 .decode
1360 PHP
1370 CMP #&E0
1380 BNE notourosword
1390 PLP
1400 LDA #34
1410 STA rowcounter
1420 STX &A8
1430 STY &A9
1440 LDY #2
1450 LDX #0
1460 .transferloop
1470 LDA (&A8),Y
1480 STA &70,X
1490 INX
1500 INY
1510 CPY #12
1520 BNE transferloop
1530 LDA #1
1540 STA gotrowzero
1550 JSR setpointers
1560 LDA #&A0
1570 LDY #0
1580 LDX #4
1590 .clearloop
1600 STA (copy),Y
1610 INY
1620 BNE clearloop
1630 INC copy+1
1640 DEX
1650 BNE clearloop
1660 TXA
1670 LDX #24
1680 .flagclear
1690 STA flag,X
1700 DEX
1710 BPL flagclear
1720 .disploop
1730 LDY #1
1740 LDA (page),Y
1750 CLC
1760 ADC gotrowzero
1770 BEQ exit
1780 LDA (page),Y
1790 BNE notzero
1800 JMP zero
1810 .notzero
1820 STA row
1830 CMP #255
1840 BEQ exit
1850 CMP #24
1860 BCS skip
1870 TAX
1880 JSR setpointers
1890 .multloop
1900 JSR add40
1910 DEX
1920 BNE multloop
1930 LDY #1
1940 .copychar
1950 INY
1960 LDA (page),Y
1970 ORA #&80
1980 DEY
1990 DEY
2000 STA (copy),Y
2010 CMP #&8D
2020 BNE notdouble
2030 LDX row
2040 DEC flag,X
2050 .notdouble
2060 INY
2070 INY
2080 CPY #41
2090 BNE copychar
2100 .skip
2110 JSR add42
2120 BEQ exit
2130 JMP disploop
2140 .exit
2150 JSR setpointers
2160 LDX #0
2170 .correctloop
2180 JSR add40
2190 INX
2200 LDA flag,X
2210 BEQ nodouble
2220 JSR copyline
2230 .nodouble
2240 CPX #23
2250 BCC correctloop
2260 LDY #12
2270 LDA (&A8),Y
2280 PHA
2290 INY
2300 LDA (&A8),Y
2310 LDY #1
2320 STA (subpage),Y
2330 PLA
2340 DEY
2350 STA (subpage),Y
2360 LDY #14
2370 .checkstringloop
2380 LDA (&A8),Y
2390 STA (checkstring),Y
2400 INY
2410 CMP #13
2420 BNE checkstringloop
2430 RTS
2440 .copyline
2450 LDY #39
2460 .copylineloop
2470 LDA (copy),Y
2480 STA (copy40),Y
2490 DEY
2500 BPL copylineloop
2510 INX
2520 JMP add40
2530 .zero
2540 LDA #0
2550 STA gotrowzero
2560 JSR setpointers
2570 LDY #10
2580 .zeroloop
2590 LDA (page),Y
2600 ORA #&80
2610 DEY
2620 DEY
2630 STA (copy),Y
2640 INY
2650 INY
2660 INY
2670 CPY #43
2680 BNE zeroloop
2690 JMP skip
2700 .add42
2710 LDA page
2720 CLC
2730 ADC #42
2740 STA page
2750 LDA page+1
2760 ADC #0
2770 STA page+1
2780 DEC rowcounter
2790 RTS
2800 .add40
2810 LDA copy40
2820 CLC
2830 ADC #40
2840 STA copy40
2850 LDA copy40+1
2860 ADC #0
2870 STA copy40+1
2880 LDA copy
2890 CLC
2900 ADC #40
2910 STA copy
2920 LDA copy+1
2930 ADC #0
2940 STA copy+1
2950 RTS
2960 .gotrowzero
2970 OPT FNequb(0)
2980 .rowcounter
2990 OPT FNequb(0)
3000 .row
3010 OPT FNequb(0)
3020 .flag
3030 OPT FNequd(0)
3040 OPT FNequd(0)
3050 OPT FNequd(0)
3060 OPT FNequd(0)
3070 OPT FNequd(0)
3080 OPT FNequd(0)
3090 OPT FNequd(0)
3100 .end
3110 ]
3120 NEXT pass
3130 ENDPROC
3140 :
3150 DEF FNequb(b%)
3160 ?P%=b%
3170 P%=P%+1
3180 =pass
3190 :
3200 DEF FNequw(b%)
3210 ?P%=b% MOD 256
3220 P%?1=b% DIV 256
3230 P%=P%+2
3240 =pass
3250 :
```

Continued ►

Network Page listing 1 continued

```
3260 DEF FNequd(b%)
3270 !P%=b%
3280 P%=P%+4
3290 =pass
3300 :
3310 DEF PROCoscli(string$)
3320 DIM X% &FF
3330 Y%=X% DIV 256
3340 $X%=string$
3350 CALL &FFF7
3360 ENDPROC
3370 :
3380 DEF PROCclearmem
3390 FOR I%=&900 TO &AFE
3400 ?I%=0
3410 NEXT I%
3420 ENDPROC
3430 :
3440 DEF PROCchecksum
3450 C=0
3460 FOR I%=&900 TO &AFE
3470 C=C+?(I%)
3480 NEXT I%
3490 IF C<>52811 THEN PRINT "Check listing.":END
3500 ENDPROC
```

Listing 2. Teletext fileserver

```
10 REM TFS Network teletext server
20 REM by Alistair Shimmin
30 REM for BBC B/B+/M
40 REM (c) Acorn User August 1988
50 :
60 version$="2.0"
70 binvers%=2*16+0
80 server$="TELETEXT"
90 serverinport=&B3:serveroutport=&B2
100 pageport=&B4
110 findserverport=&B0
120 serverresponseport=&B1
130 :
140 ON ERROR GOTO 5070
150 *FX 200,1
160 X%=0:Y%=255:A%=&EA:tube%=(USR(&FFF4) AND &FF00)>0
170 *FX 20
180 X%=0:Y%=255:A%=&B4:oshwm%=USR(&FFF4) AND &FF00
190 IF tube% THEN space%=&7800-oshwm% ELSE space%=HIMEM-TOP-&1900
200 maxchanpage%=space%/&594
210 IF maxchanpage%>20 THEN maxchanpage%=20
220 MODE 7
230 VDU 28,0,24,39,2
240 DIM logon% 16,timedout% 10,data% &40,num%(4),time%(4),station%(4,20),page%(4,20),message% &50,mem%(20),rec%(20),assocpage%(20),used%(20),recflag%(20),rollflag%(4,20),requesttime%(4,20),starttime%(20)
250 DIM requestpriority%(4,20),blk% &30
260 dummy%=&0FFFFFFF
270 READ rolltime
280 request%=0
290 FOR I%=1 TO 4
300 READ time%(I%)
310 requestpriority%(I%,1)=dummy%
320 NEXT
330 VDU 23,1,0;0;0;0;
340 IF tube% THEN copy=oshwm%:buff%=copy+&400 ELSE DIM buff% &594*(maxchanpage%),copy &400
350 PROCinit
360 ?blk%=5
370 blk%?1=255
380 X%=blk%:Y%=X% DIV 256
390 A%=&13:CALL osword
400 queue%=0
410 *TTXON
420 *HON
430 *CH1
440 TIME=0
450 PROCgettimeanddate
460 PROCsetrows(30)
470 *RUN CODE
480 B%=FNsetuprx(serverinport,0,message%,&50)
490 BB%=FNsetuprx(findserverport,0,logon%,8)
500 Ch%=1
510 REPEAT
520 Ch%=FNnextchannel
530 PROCinitnewchannel
540 REPEAT
550 PROCnetwork
560 PROCteletext
570 IF TIME>starttime%(rec%(1))+time%(Ch%) THEN PROCtoolong
580 UNTIL(FNnextchannel<>Ch%) OR ((TIME-lastupdate%>60*60*100) AND queue%=0)
590 IF TIME-lastupdate%>60*60*100 THEN PROCgettimeanddate
600 UNTIL FALSE
610 END
620 :
630 DEF PROCinitnewchannel
640 PROCoscli("CH"+STR$(Ch%))
650 PROCclear
660 FOR I%=0 TO 20
670 recflag%(I%)=0
680 assocpage%(I%)=0
690 used%(I%)=0
700 NEXT
710 IF num%(Ch%)>0 THEN PROCsetuprecords
720 ENDPROC
730 :
740 DEF FNfreerecord(testp%)
750 match%=FALSE
760 fr%=-1
770 REPEAT
780 fr%=fr%+1
790 IF assocpage%(fr%)=testp% THEN match%=TRUE:matchpage%=fr%
800 UNTIL match%=TRUE OR fr%=maxchanpage%
810 IF match%=TRUE THEN =matchpage%
820 fr%=-1
830 REPEAT
840 fr%=fr%+1
850 UNTIL used%(fr%)=0 OR fr%=maxchanpage%
860 IF fr%<maxchanpage% THEN =fr%
870 fr%=-1
880 REPEAT
890 fr%=fr%+1
900 UNTIL recflag%(fr%)=0
910 =fr%
920 :
930 DEF PROCtoolong
940 IF num%(Ch%)=0 THEN ENDPROC
950 $(timedout%)="Timed out"
960 PROCtx(pageport,&81,station%(Ch%,1),timedout%,10)
970 PROCreorder(1,Ch%)
980 ENDPROC
990 :
1000 DEF FNnextchannel
1010 chosen%=dummy%
1020 nextchan%=FNchannel
1030 FOR findlowest%=1 TO 4
1040 IF requestpriority%(findlowest%,1)<chosen% THEN chosen%=requestpriority%(findlowest%,1):nextchan%=findlowest%
1050 NEXT
1060 =nextchan%
1070 :
1080 DEF PROCsetuprecords
1090 FOR R%=1 TO num%(Ch%)
1100 result%=FNalready(R%-1,page%(Ch%,R%))
1110 IF result%=-1 THEN PROCunique(R%) ELSE PROCnotunique(R%,result%)
1120 NEXT
1130 ENDPROC
1140 :
1150 DEF PROCunique(U%)
1160 free%=FNfreerecord(page%(Ch%,U%))
1170 rec%(U%)=free%
1180 starttime%(free%)=TIME
1190 recflag%(free%)=recflag%(free%)+1
1200 mem%(U%)=buff%+&594*free%
1210 PROCsetuprecord(page%(Ch%,U%),free%,buff%+&594*free%)
1220 ENDPROC
1230 :
1240 DEF PROCnotunique(U%,L%)
```

Continued ▶

Network listing 2 continued

```
1250 rec%(U%)=rec%(L%)
1260 recflag%(rec%(L%))=recflag%(rec%(L%))+1
1270 mem%(U%)=buff%+&594*rec%(L%)
1280 ENDPROC
1290 :
1300 DEF FNalready(max%,p%)
1310 IF max%=0 THEN =-1
1320 already%=FALSE
1330 look%=0
1340 REPEAT
1350 look%=look%+1
1360 IF page%(Ch%,look%)=p% THEN already%=TR
UE
1370 UNTIL look%=max% OR already%=TRUE
1380 IF already%=TRUE =look%
1390 =-1
1400 :
1410 DEF PROCteletext
1420 IF num%(Ch%)>0 THEN PROCpagetest
1430 ENDPROC
1440 :
1450 DEF PROCpagetest
1460 R%=0
1470 REPEAT
1480 R%=R%+1
1490 status%=FNreadrecordflag(rec%(R%))
1500 IF (status% AND 2)=2 THEN PROCtransmitp
age
1510 UNTIL R%>=num%(Ch%)
1520 ENDPROC
1530 :
1540 DEF PROCtransmitpage
1550 IF ((TIME-requesttime%(Ch%,R%))/time%(C
h%)<rolltime) AND rollflag%(Ch%,R%) THEN ENDP
ROC
1560 update%=TIME
1570 REPEAT
1580 recordflag%=FNreadrecordflag(rec%(R%))
1590 UNTIL (recordflag% AND 4)=0 OR TIME>upd
ate%+50
1600 PROCsetrecordflag(rec%(R%),recordflag%
OR 1)
1610 PROCdisplay(mem%(R%))
1620 PRINT'FNstation(station%(Ch%,R%));TAB(8
)"..Receiving page ";page%(Ch%,R%);" on ";Ch%
;"..";
1630 PROCsetrecordflag(rec%(R%),recordflag%
AND 254)
1640 PROCtx(pageport,&80,station%(Ch%,R%),co
py OR &FFFF0000,&400)
1650 VDU 23,1,0;0;0;0;
1660 PROCreorder(R%,Ch%)
1670 R%=R%-1
1680 ENDPROC
1690 :
1700 DEF PROCinit
1710 osword=&FFF1
1720 osbyte=&FFF4
1730 oswrch=&FFEE
1740 ENDPROC
1750 :
1760 DEF PROCcall(code%)
1770 ?blk%=code%
1780 X%=blk%:Y%=X% DIV 256
1790 A%=&7A:CALL osword
1800 ENDPROC
1810 :
1820 DEF PROCclear
1830 PROCcall(14)
1840 ENDPROC
1850 :
1860 DEF PROCsetrows(r%)
1870 blk%?1=r%
1880 PROCcall(7)
1890 ENDPROC
1900 :
1910 DEF FNreadrecordflag(p%)
1920 blk%?1=p%
1930 PROCcall(2)
1940 =blk%?2
1950 :
1960 DEF PROCsetuprecord(p%,r%,l%)
1970 IF r%=maxchanpage% THEN ENDPROC
1980 IF assocpage%(r%)=p% THEN ENDPROC
1990 PROCcall(16)
2000 blk%?1=r%
2010 blk%?2=p% DIV 100
2020 lo%=p% MOD 10
2030 hi%=(p% MOD 100) DIV 10
2040 blk%?3=&10*hi%+lo%
2050 blk%?4=p% MOD 10
2060 blk%?4=&3F
2070 blk%?5=&7F
2080 blk%!6=l%
2090 PROCcall(5)
2100 PROCsetrecordflag(r%,&80)
2110 assocpage%(r%)=p%
2120 used%(r%)=1
2130 ENDPROC
2140 :
2150 DEF PROCsetrecordflag(p%,v%)
2160 blk%?1=p%
2170 blk%?2=v%
2180 PROCcall(3)
2190 ENDPROC
2200 :
2210 DEF PROCdisplay(loc%)
2220 check$=FNcheck(loc%)
2230 L=LEN(check$)
2240 !data%=14+1+40
2250 data%!2=loc%:data%!4=copy:data%!6=copy+
40:data%!8=copy+&3FE:data%!10=copy+24*40-14:d
ata%!12=loc%!3
2260 $(data%+14)=STRING$(39-L," ")+check$
2270 X%=data%:Y%=X% DIV 256:A%=&E0:CALL oswo
rd
2280 ENDPROC
2290 :
2300 DEF PROCreorder(rd%,ch%)
2310 LOCAL I%
2320 IF num%(ch%)=0 THEN ENDPROC
2330 IF Ch%=ch% THEN recflag%(rec%(rd%))=rec
flag%(rec%(rd%))-1
2340 FOR I%=rd% TO num%(ch%)-1
2350 page%(ch%,I%)=page%(ch%,I%+1)
2360 station%(ch%,I%)=station%(ch%,I%+1)
2370 IF ch%=Ch% THEN mem%(I%)=mem%(I%+1)
2380 IF ch%=Ch% THEN rec%(I%)=rec%(I%+1)
2390 requestpriority%(ch%,I%)=requestpriorit
y%(ch%,I%+1)
2400 rollflag%(ch%,I%)=rollflag%(ch%,I%+1)
2410 requesttime%(ch%,I%)=requesttime%(ch%,I
%+1)
2420 NEXT
2430 queue%=queue%-1
2440 num%(ch%)=num%(ch%)-1
2450 IF num%(ch%)=0 THEN requestpriority%(ch
%,1)=dummy%
2460 ENDPROC
2470 :
2480 DEF PROCdelay(time)
2490 T%=TIME
2500 REPEAT UNTIL TIME>T%+time
2510 ENDPROC
2520 :
2530 DEF FNcheck(l%)
2540 blk%?1=l% MOD 256
2550 blk%?2=l% DIV 256
2560 PROCcall(23)
2570 IF blk%?3=0 THEN ="No check"
2580 IF blk%?3=1 THEN ="Good check"
2590 IF blk%?3=&FF THEN ="Bad data"
2600 ="Bad check"
2610 :
2620 DEF PROCoscli(os$)
2630 $blk%=os$
2640 X%=blk%:Y%=X% DIV 256
2650 CALL &FFF7:ENDPROC
2660 :
2670 DEF PROCtx(p%,cb%,st%,b%,l%)
2680 tries%=0
2690 REPEAT
2700 tries%=tries%+1
2710 ?blk%=cb%
2720 blk%?1=p%
2730 blk%!2=st%
2740 blk%!4=b%
2750 blk%!8=b%+l%
2760 X%=blk%:Y%=X% DIV 256:A%=&10
2770 CALL osword
2780 UNTIL tries%>5 OR FNpolltx=0
```

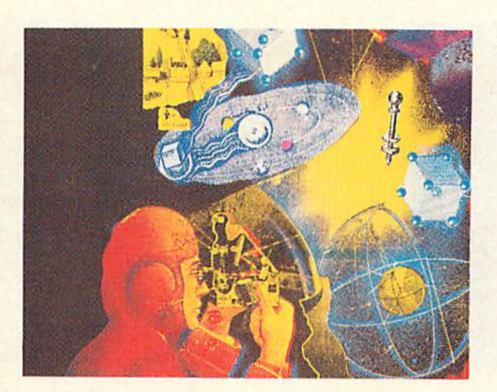
Continued on page 123 ▶

OFFERS

THIS MONTH'S LISTINGS

The August disc contains the first part of *Acorn User*'s mega space-time adventure game, *Warlord*. Part two will follow on September's disc.

Joe's Jottings will enable you to present your figures from Joe's spreadsheets in bar, pie and line graph form. Use August's Hints and Tips background program to print out the contents of your screen with a single key stroke. The programs from Arc Agora are also on the discs and 3.5-in format is available by turning to page 101. Archimedes owners can use the screen utilities program to load, save and compact all your screens. There is also a tutorial program which will show how to use events, or you can use Directory to draw a tree of all your files and directories.



Augusts listings come on 5.25-in 40/80-track disc at £5.95, 3.5-in disc for the Archimedes and Compact at £6.95.

Warlord — The adventurer's guide to the Galaxy

DISC SUBSCRIPTIONS

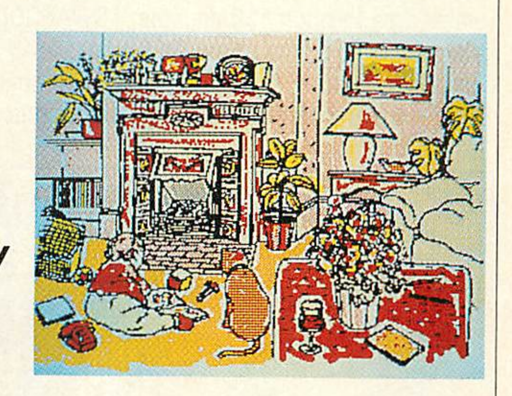
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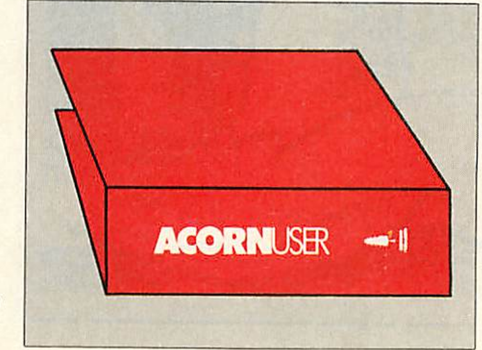


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Have you missed any issues of *Acorn User* magazine, discs or cassettes? *Acorn User* has been publishing the essential guide to Acorn computing for five years. Think what you might have missed! Take this opportunity to make up your collection. Remember that all pre-1987 discs and cassettes are still at the sale price of £3.95 and £2.95. Most issues are still available but stocks are getting very low. For a complete list of back issue contents write to: Seran Haddick, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.

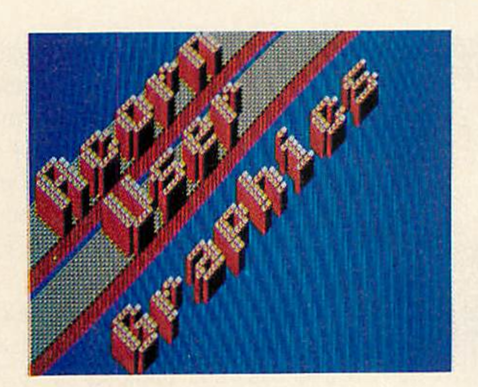


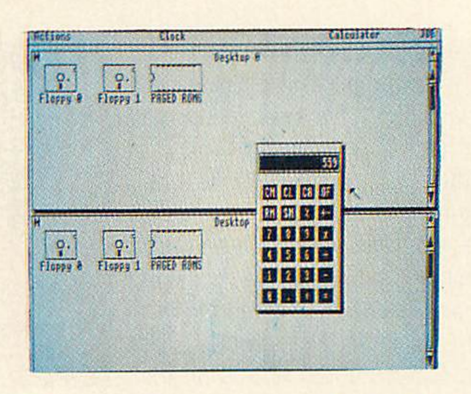
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OFFERS

SOFTWARE & GRAPHICS





Great graphics utilities

The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 stand-alone machine code utilities, an advanced teletext editor, several useful Basic procedures, an easy-to-adapt disc header and index. Included are: *ROTATE, rotates area through 180 degrees; *SWAPCOL, swaps two colours; *COLFILL, a colour fill routine; *SVPIC, saves a compacted picture; *LDPIC, reloads a compacted picture. There are many utilities to manipulate graphics.

The best of '87 compilation disc

All your favourite programs from 1987 on one disc, including Kiddie Art; Tapestry; PCB by CAD; music programs, Theme and Autumn; Joe Telford's GEM-like front-end for the Master; a proportional screen dump; a *View* printer driver generator and a routine for printing spreadsheets sideways. The second half of the disc is devoted to graphics, with a video image enhancer and six Graphics Bonuses. The 80-track disc, with comprehensive manuals, is only £6.95.



Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *Acorn User*.

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers*, a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, Willow (Nov '86) and Magician (Jan '86), as well as several pictures commissioned by *The Times*.

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside*, Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

You can create your own *pièce de résistance* using the Pixel Editor and Super Painter programs. Pixel Editor allows you to draw in and alter minute detail, while Super Painter enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

Portfolio comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

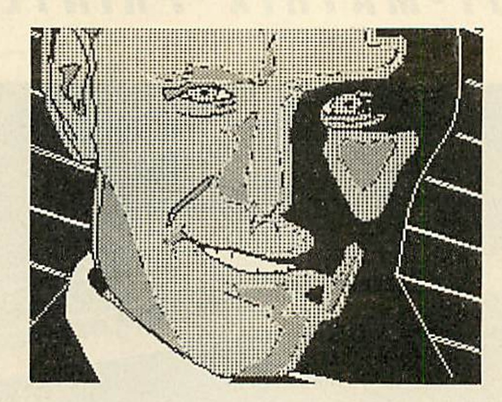
TO ORDER USE THE FORM ON PAGE 102

OFFERS

USERDUMP ROM

BBC/B/B+/M/C The *UserDump* ROM will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing it directly from the keyboard. A perfect dump can also be obtained while a machine code program is running.

UserDump can dump a graphics window, make a distortion-free dump of mode 0 screens using plotter graphics,



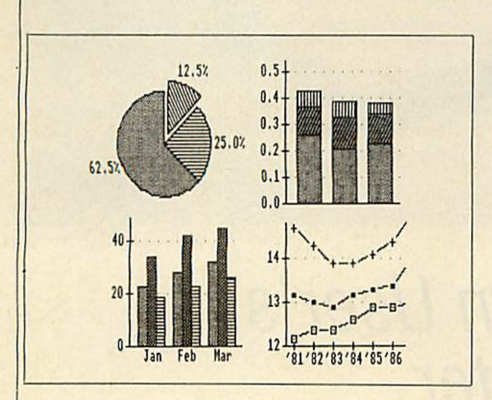
translate a teletext screen into mode 1, and shift any area of memory.

UserDump will work with any Epson-compatible printer which has single-density and double-density bit-image graphics including the Star Gemini, Delta, SG, SD and SR, Canon and Kaga NLQ.

Details of further commands and printer compatibility are available from Seran at Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.

Trouble-free screen dumps for £19.95 with UserDump

VIEWCHART DISC



BBC/B/B+/M/C *ViewChart* features a suite of programs which can be used to produce high-resolution graphics in pie chart, bar chart or line graph form. Data can be entered manually, or read from *ViewSheet*, *ViewStore* or *View* files.

Present figures with ViewChart

The charts can be labelled and shaded to give a really professional appearance.

Epson-compatible screen dumps are included, one of which will produce a print-out to the full width of an A4 sheet. Screen dumps for other printers can be painlessly installed.

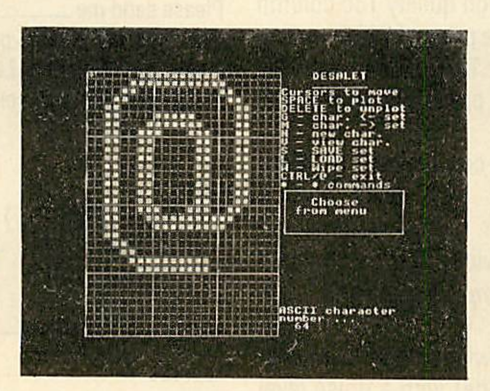
The software is provided on a 5.25-inch 40-track disc (with 80-track converter). And the price of this professional package? Just £12.95.

CALLIGRAPHY DISC

BBC/B/B+/M/C/E Now you can produce professional tickets, letterheads and posters with the *Calligraphy* disc.

Desalet is a font creator which produces customised letters to your personal design and saves you using repetitive data statements and error-prone calculations. All font sets can be up to 94 characters long.

Modical allows the use of disc-based



font sets created with *Desalet*. *Modical* incorporates a modified file creation program, which allows files to be printed out immediately or saved for later.

An enhanced font ROM, in the form of a sideways RAM image, allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true Wysiwyg.

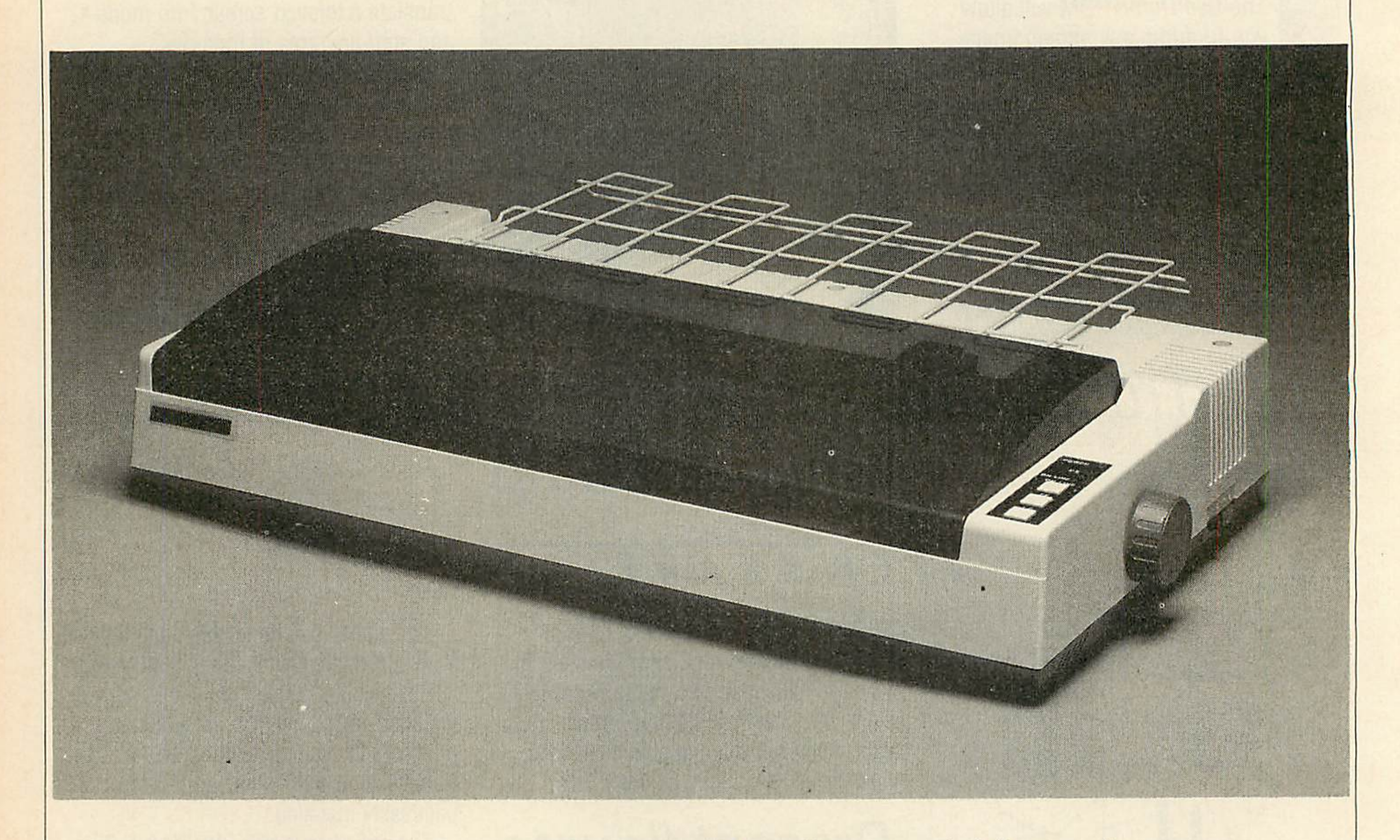
This superb disc comes on 40/80-track 5.25-inch disc and is only £9.95.

Design your own fonts with Calligraphy

ORDER WITH THE FORM ON PAGE 102

OFFERS

DOT-MATRIX PRINTER



Get into print with Acorn User's wide-carriage printer

This could be your last chance to buy this high quality 136 column Sakata wide-carriage printer for an inclusive price of £259, saving over £100 on the recommended retail price. The government have put a duty of 35 per cent on all printers and prices will be rising to accomodate it.

The Sakata 5500 printer is Epson FX-compatible. It offers the following features: pica, elite and NLQ fonts plus a downloadable character set; a 3k printer buffer; friction and tractor feed for paper up to 16 inches wide; graphics modes compatible with *Acorn User*'s *UserDump*; super and subscripts; bold and italics.

The printer is both fast and quiet. It will print at a rate of 180 cps (draft mode) or 40 cps (NLQ mode) with a noise level of less than 55 decibels.

Each printer comes with a free 1.5 metre BBC printer cable and plug. Replacement ribbons are easily obtainable.

The printer comes with a 12-month guarantee and a supplement for the BBC micro.

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REVIEWS

THE GAMES PAGE

ADDICTED

What makes you want to rush out and buy a new game? As well as checking out the new releases, Sam Greenhill suggests some compelling reasons

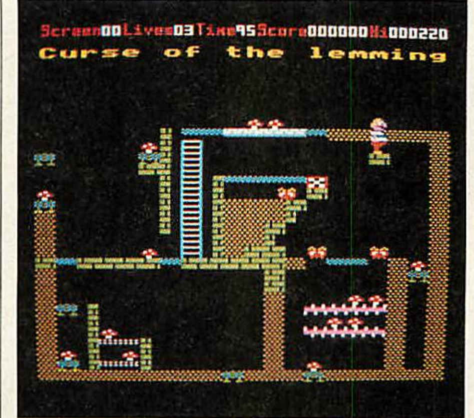
As August is a quiet time, I'm going to ask the crucial question to which I'm sure all games companies would like the answer – what makes a good game?

But first a quick peek at the latest news. Audiogenic has two new games lined up. *Shark*, which was mentioned last month, is going through its final test and sounds quite good. There are three scenarios to get to grips with. In the jungle you swing from vines and leap over rivers like Tarzan. In the factory (what factory?) you must crawl along pipes, girders and such, and then you have to weave among buildings in the big city. But for what purpose? Well, it's obvious – to escape the aliens who have invaded the planet.

Audiogenic's second game is very much in the same vein as *Pengo*. *Pengo* involved a cute little penguin whose task was to destroy the 'monsters' by sliding ice cubes about and squashing them. The action took place in a freezer room, and was a varied but addictive 'kill everything' game. Audiogenic's version is called *Breakthrough*, and relies more on strategy than the original *Pengo*. Through the hundred rooms you must collect keys and other objects, but don't dawdle – you only have 99 seconds to complete each level!

Icarus is currently my favourite game, and is a marvellous debut for new games house Mandarin Software. Mandarin doesn't write the games itself, but it markets programs put together by other teams. *Icarus* comes from the authors of the old Bug-Byte game *Dunjunz*. Its main attraction is the facility for two people to play together and help each other out. You progress through 20 levels collecting the pass cards and shooting the lifts. It is another reincarnation, this time of the popular *Gauntlet*, and is highly addictive.

Mandarin has also teamed up with Level 9 to release a trilogy of adventures. *Price of Magik*, *Lords of Time*, and *Red Moon* are all old news, but they have been enhanced with extra text and more pictures added.



***Mushrooms*: first screen designer for the Beeb**

And now on to that crucial question – what makes a good game?

A game can be successful for a galaxy of different reasons, but I think the most important is addiction. It is unlikely to succeed unless it can persuade you to 'have another go'. A good example of this is Mirrorsoft's *Tetris* – although the graphics aren't up to much, the game simply keeps you up all night. There are four other categories that games are often rated on (except perhaps text adventures) – graphics, sound, originality and versatility.

Graphics are intriguing, and an obvious example where this has helped a game is *Stryker's Run*. I don't think the game itself is all that addictive, but the superb pictures make everyone want a go – particularly with the enhanced graphics of the Master version. Conversely, sound doesn't appear to have much effect on a game's rating unless it is either very bad or very good, which is why most games don't concentrate too much on it.

The same goes for originality. As long as it's addictive, most players don't really seem to mind if it is a spruced up copy of another game – provided that they don't have the other game. If a game is successful it isn't difficult to predict a sequel, and people will usually buy this regardless of any similarity to the first game.

Depth is an important factor for a good game, and of course *Elite* is awarded first prize for its 'infinite' appeal. *Zarch* is by no means as 'deep' as *Elite*. It has an 'instant' appeal drawn from its fantastic graphics, and that doesn't fade. But the game doesn't develop, or 'open up' as you play it.

However other games have the potential for enormous versatility by incorporating screen designers. Screen designers really make a game endless. *Xor* is a great example of this. Superior's recent hoard of arcade-adventures such as *Palace of Magic* were good while they lasted but once completed there is really no point in playing any more. Yet I still play *Magic Mushrooms* from Acornsoft, and I enjoy *Repton 3*, because they each have screen designers and therefore a large potential. *Grand Prix Construction Set* from Superior has a screen designer too, although is limited in that there are only a small number of scenes possible. You either have a straight, a curve, a bridge or a chicane. With *Repton* or *Magic Mushrooms* you can have a combination of all the icons to produce a different effect each time.

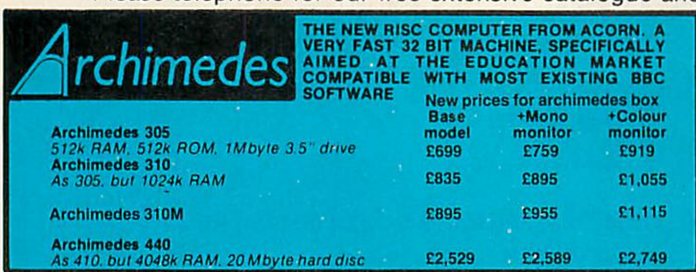
I've run out of space for now, but take a look at this month's *Warlord* adventure game while you wait for the next Games Page. Don't forget to send in any cheats or high scores! I would also like to hear your views on what makes a good game. Even some ideas for plots would be welcome, especially ones that make good use of the Arc. Send any suggestions to me at The Games Page, *Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Together we'll get some more good games on the market!



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DON'T LOSE YOUR HEAD



Barbarian; Superior Software; BBC/ Electron tape £9.95, BBC disc £11.95.

In *Barbarian* you play the part of the ultimate warrior, whose task it is to save the princess from the evil sorcerer and his henchmen. The game is in a style similar to that of other head-to-head combat games, such as karate and boxing. But this time the weapons are swords.

You may fight either the computer, a friend or a passive opponent for practice. I found the last to be most useful, it being the only mode in which I could win when I first played the game.

Also included is a demo mode, in which two computer-controlled men fight against one another.

The only moving objects in the whole game are the two fighters and a little character who walks across the screen and drags off the body of the fallen warrior at the end of the fight.

The warrior sprites are quite large — and they need to be, since there is no form of vertical movement in the game. The men are animated well, there are no nasty black blocks around the edges of the sprites, and there is no flicker.

In contrast the clean-up minion at the end of the game flickers a little: I get the impression this was the last thing to be added to the program.

Control is either by joystick or keyboard. You soon see the need for a practice option when you realise that to produce some movements requires a finger-tingling combination of three keys at once.

But once the keys are mastered, you may stand a chance against the computer opponents. After a few attempts I found that these sometimes lose their heads, especially after the flying neck chop.

Playing *Barbarian* is very enjoyable, and sometimes frustrating. It's the animation that makes this game stand out from some of the other combat games. Watching the demo mode reminded me of a Kung Fu film I saw recently, except in *Barbarian* the acting is better.

Gavin Gillings

STRANDED IN SPACE

Stranded; Heyley Software (24 Ley Hey Road, Marple, Stockport SK65 6PQ); BBC B disc £9.95, Archimedes £12.95.

A little-known company called Heyley Software appears to have won the race to release the first adventure for the Arc. It is, however, an extended version of a game already available for the original BBC from the same company.

You start off trapped in a cell aboard a starfreighter. An ugly guard keeps a close watch, but if you let time take its course, freedom becomes a distinct possibility. Having eluded the guard, you must then find a way to land the ship and escape.

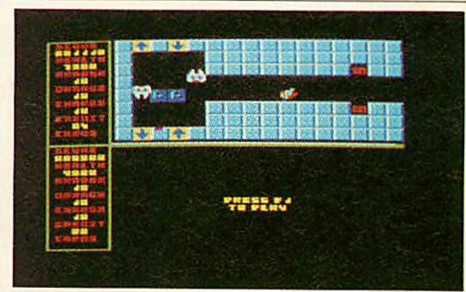
Adventures that employ a futuristic background often get bogged down in technical jargon. Fortunately *Stranded* doesn't, and it's generally very tongue-in-cheek. There are even a few surprise guests along the way with appearances from Tommy Cannon (Cannon and Ball) and Marillion lead singer Fish.

Technically, the game is OK, but the disc is accessed frequently. I would have thought that, given the Arc's large memory capacity, most of the adventure could be loaded in at one go. There is, though, a kind of RAM disc facility available to store your current position. Games can also be saved to disc if a more permanent record is required.

Although all commands can be typed in, the save facility and other useful commands can be accessed via the mouse. The icons at the top of the screen relate to short or verbose text descriptions, storage of the current position, and useful commands such as INVENTORY and SCORE. The game is enjoyable and amusing to play – and I haven't managed to finish it yet.

Rob Miller

KEEP OUT OF THE SUN



Icarus; Mandarin Software; £9.95 (cass) for BBC B, Master and Electron; £11.95 on disc (5.25-in or 3.5-in) for all BBC/ Acorn machines.

Icarus is the first release from new games publishers Mandarin, although it's programmed by Powerhouse, the team behind *Dunjunz*. The scenario is in the *Plan B* mould; wander around a spaceship and try to wrest control of the central computer, all the while shooting at the computer's defence droids. It's called *Icarus* because the spaceship is out of control and plunging towards the sun. Only by getting to the computer can you avert disaster.

However, the game looks nothing like *Plan B*. Its main novelty is that two can play, and it's certainly easier with an ally. There are 20 levels to fight your way through, with lifts to destroy and droids to kill. Parts of each level are protected by force fields, which can only be turned off by pushing buttons in a particular sequence. With two people playing, one can crack the code while the other provides covering fire. But if you're playing on your own you have to destroy all the lifts and droids first or you'll probably die. The problems are nicely judged, easy to start with but getting harder. But like most of these sort of games, there is a certain 'sameness' about every level.

The movement is quite smooth, and there's lots of it. There's a lot of action and rapid firing, and it takes more than one hit to kill each droid. But the sprites are relatively small and the sound is rudimentary. I found it fun to play, and easy to get the hang of (you can pick which keys to use), and it's one of those rare games that works well on the Electron too. Overall, pretty good value.

Graham Bell

SOFTWARE

WORDLY WISE

Martin Phillips tries out two wordprocessors capable of handling languages from Greek to geometry

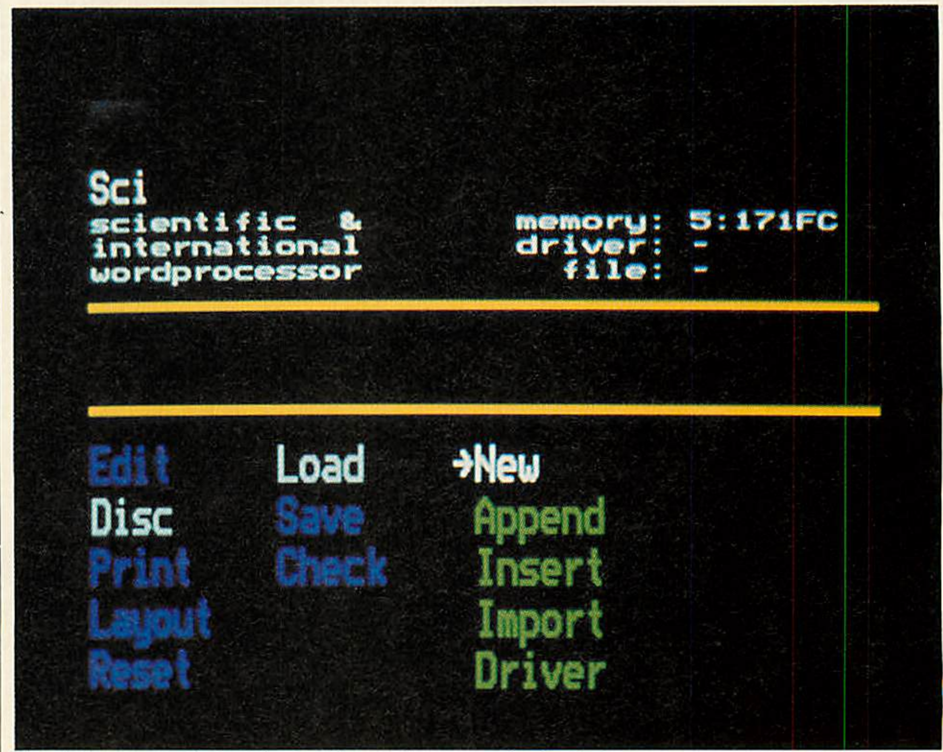
A wordprocessor can benefit almost any teacher, both in the classroom with pupils, and for preparing written materials. Here presentation is the key factor, plus the ability to save text on disc and perhaps revamp it later. There are several good wordprocessors for the BBC, but most of them will only allow special characters with great difficulty.

Now two wordprocessors have come along with the express aim of enabling scientific and mathematical formulae to be entered quickly and easily. One will also allow a whole range of accented and special characters, making it suitable for most European languages.

Vue Scientific from Intelligent Machines costs £47.50 and comes as a ROM chip, with manual and keystrip. *Sci* (pronounced 'ski', so I am informed) costs £29.90 from Chessfield Software. It too comes as a ROM, with a disc, manual and keystrip. Both are designed to work on a BBC B with a sideways RAM card, a BBC B+ or Master. This should not prove a limitation, as I suspect most secondary schools will now have at least one Master. Both these packages have a range of facilities comparable with other BBC wordprocessors, as well as their extra functions to deal with equations and special characters.

The first thing to do with any piece of software is look at the handbook. The *Vue* manual is well laid out with 41 pages in A5 format. The print is rather too small for my ageing eyes, though the screen shots are useful, and the explanations are particularly thoughtfully done. The *Sci* handbook is a 40-page loose-leaf A4 handbook with larger print, mercifully. Both handbooks explain the use of the wordprocessors well, though there are some serious omissions from the *Vue* handbook – the most vital of these being an index.

I put the chips into a BBC Master using a ROM cartridge, that masterpiece of bad design from Acorn. Neither manual gives any help in fitting ROMs, which is a bad point as many teachers have difficulty knowing how to do this. *Vue* did weird and wonderful things until I looked at the covering letter and noticed that I should have typed *SHADOW before loading it. There is no mention of this in the handbook, and having to type this each time it is used can become a real pain. Both wordprocessors have a menu system from which the main functions can be accessed. *Vue* is less friendly and requires prompts in capital letters.



The *Sci* menu may look plain, but the wordprocessor is simple to use


***Sci* displays special characters on screen**

The *Sci* menu page is a delight. It looks rather plain and uninteresting at first, but once you discover the way a series of menus unfolds from the main menu, the wordprocessor is simple to use. From the main menu a whole range of features can be accessed. On many wordprocessors these features are accessed from the function keys, with *Sci* the function keys are reserved for more important things.

Editing is straightforward with both wordprocessors, with *Vue* gaining a few points by having a simpler method of entering complex formulae, which means they can be moved around the screen more easily. Both packages are Wysiwyg (What You See Is What You Get, a horrible acronym which indicates that the screen display shows exactly what it will look like when it is printed out). It is fairly easy to access the special characters with both wordprocessors, though *Sci* has a help button which displays the various characters on screen. A problem I found with 80-column mode was seeing some of the characters clearly, not because of my failing eyesight this time, but because they

REVIEWS

SOFTWARE

were superscripted or subscripted. *Sci* has the perfect answer, a function key which switches between 40-and 80-column mode. This can also be done with *Vue* but it involves pressing Break and almost re-entering the program. *Sci* allows italics, underlined or bold text to be accessed from the function keys and displayed on the editing screen.

Printing out proves to be fun. I tried *Sci* first and with the proper printer driver my Citizen 120D printer worked well and at quite impressive speed. *Sci* has a series of printer drivers for all the common makes of dot-matrix and laser printers. The manual goes into some detail on their use, and is very helpful. *Vue,* on the other hand, has just 16 lines on printing in the handbook, and presents that tired expression 'Epson-compatibility' with the usual assumption that it actually means something. Printing user-defined characters is perhaps the least compatible part of any printer standardisation, and my Citizen proved to be an efficient paper dispenser, throwing out pages of paper with the odd couple of characters on each page. I gather that few printers are truly 'Epson-compatible' in this area, including the Epsons themselves.

Eventually I borrowed a trusty Epson FX80, which still did not work until I remembered to alter the dip switch settings (you're assumed to know all about these of course). Again there is no mention of this procedure in the handbook, and just a reference to it in the covering letter. The *Sci* handbook doesn't mention these dip switch settings either.

Sci comes out the winner when loading and saving. It has warning messages if a file is going to be overwritten, and it allows files to be loaded from and saved to other wordprocessors – an essential feature these days. *Vue* crashes when a *Wordwise* file is loaded in.

Both wordprocessors have many more facilities than I have space to mention here, as they are complete wordprocessors in their own right. However, in use *Sci* outperforms *Vue* in most aspects. I found that after just half an hour's writing with *Sci* it all seemed so natural I didn't need to use the handbook. The more I used the menu system the more I grew to like it. Indeed I would be quite content to use *Sci* instead of old favourites like *View* or *Wordwise*. I would recommend it to all language, science or mathematics teachers with little reservation. It can be used by both teacher and pupils alike and has all the facilities required of a wordprocessor, with the added ability to cope with accents, special characters and equations.

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$$\partial_t u_i = -\frac{\partial p}{\partial x_i} - u_j\frac{\partial u_i}{\partial x_j} + \frac{\partial}{\partial x_j}\left[\nu\frac{\partial u_i}{\partial x_j}\right]$$

***Sci* allows a range of special characters for maths and language work, with a 9-pin Kaga 810**

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$$\Pi_{ij}(q) = i\int\frac{d^4k}{(2\pi)^4} \quad Tr\gamma_i \quad S'_F(k) \quad \Gamma_j(k,k+q) \quad S'_F(k+q)$$

$$\partial_t u_i = -\frac{\partial p}{\partial x_i} - u_j\frac{\partial u_i}{\partial x_j} + \frac{\partial}{\partial x_j}\left[\nu\frac{\partial u_i}{\partial x_j}\right]$$

Extra quality and more user-defined characters with a 24-pin NEC printer

Sci *£29.90, from Chessfield Software, 61 Chessfield Park, Little Chalfont, Buckinghamshire HP6 6RU. (Note: specify full details of your system when ordering). Trial disc available for £6.*

Vue Scientific, *£47.50, Intelligent Machines Ltd, 66 Browning Road, Bushwood Estate, London E11 3AR.*

SOFTWARE

BETTER BY DESIGN

If you want to design your own printed circuit boards, you can't beat the new high-quality, low-cost package from Pineapple, says Malcolm Brown

Any worthwhile item of electronics is produced on a printed circuit board. PCBs make the assembly of electronics relatively easy, cheap and more reliable. The fundamentals of PCB design aren't hard to grasp; you have just so many circuit components on the board which have to be connected together correctly.

When the design has been sketched out, a mask must be done. Single PCBs are made by exposing a copper-coated board to ultra-violet light, through a mask with the desired pattern marked on it – rather like exposing a piece of photographic paper through a negative in an enlarger. After 'developing' and etching the board, just the tracks in copper remain.

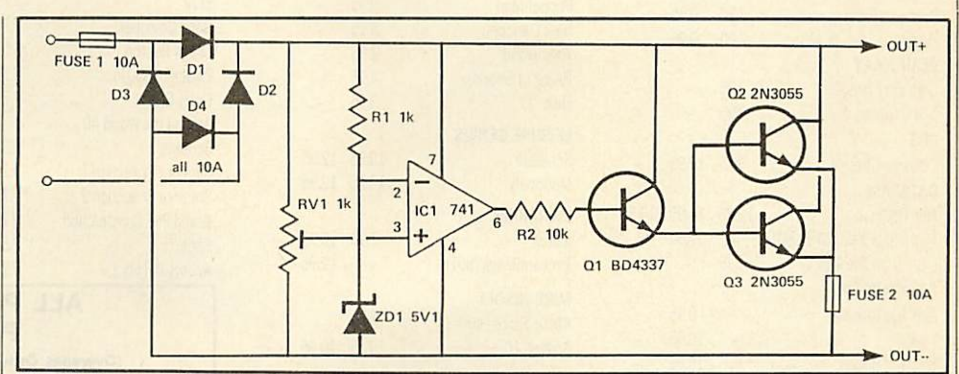
The mask (or masks for double-sided boards) can be made by hand by a tedious process using reels of black tape and rub-on transfers, but it's difficult to make the whole thing look neat. Of course computers and CAD systems have been used, but only recently has a system that could be called professional become available for the BBC micro. Pineapple Software's package provides all you need to produce PCB masks easily.

The software, called simply *PCB*, is basically a specialised drawing package. It comes on a ROM chip with a couple of example board designs on disc and a 35-page manual.

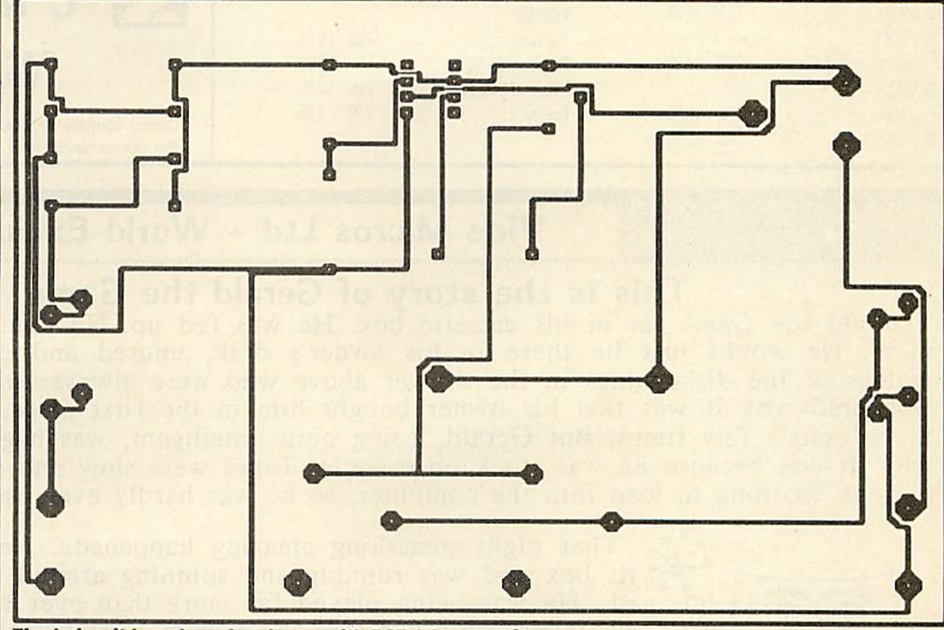
All the design work is done on a mode 1 screen, and four colours are used to distinguish between various 'layers' of the board. Apart from the background, one colour (red) is used for tracks on the top of the board, a second colour (cyan) for the tracks underneath and a third colour for the 'roundels' - the circular pads around the component lead holes.

A new board is first sized. Boards up to 8.0 by 5.6 inches are allowed. On a 12-inch monitor, the image is about life size, with graduated edges marked off in 1/10th inch.

Positioning of the components must now be decided. The shapes are selected with function keys and positioned using the arrow keys. Four basic component shapes are provided – roundels, two lead components, chips and text. The two lead elements, for resistors, capacitors, coils or any other passive component, come in vertical and horizontal orientations and once on the board can be expanded in length to suit the actual component. Similarly the chip symbols can be increased in number of pins.



Circuit diagram of a motorcycle regulator


Final circuit board mask – drawn with PCB (shown at ¾ size)

The roundels come in three sizes and the Shift-cursor keys expand a single roundel to a line or block suitable for connectors. All component roundels appear on both sides of the board so don't have to be matched up separately.

All components are placed so their roundels are exactly on a 1/10th-inch grid. This is as accurate as required. Once positioned, a component can be easily moved or deleted. A simple line drawing routine is also included at this stage for altering the edge of the board and drawing unusual component outlines. Any area can be copied elsewhere on the screen, deleted or saved to disc for use in another board. Once the positions are settled, track-routing begins. This saves the component layout and strips the design to the roundels which must be joined with copper tracks.

In the track-routing stage, three widths of track are provided (0.025, 0.05 and 0.075 inch). Selecting one of these enables tracks to be drawn in the relevant colour, following the movement of the cross cursor. Tracks can be deleted with the cursor in

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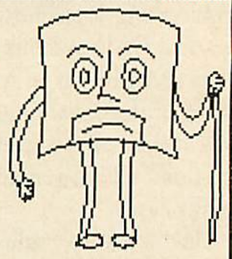
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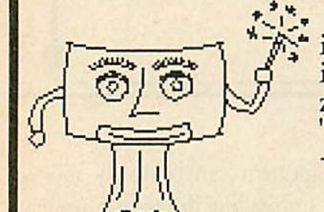
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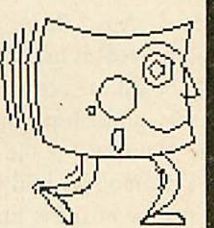
This is the story of Gerald the Game



Gerald the Game sat in his cassette box. He was fed up. No-one played him any more. He would just lie there in his owner's desk, unused and unloved. He was jealous of the disk games in the drawer above who were always being played. He'd wondered why it was that his owner bought him in the first place, if he was only to be used a few times. But Gerald, being quite intelligent, was beginning to realise why. It was because he was stuck on cassette. Tapes were slow and cumbersome and he took too long to load into the computer, so he was hardly ever used!



That night something amazing happened... He was free from the cassette and its box and was running and spinning around so fast that he could not believe it! He was being played far more than ever before... Gerald awoke in a frenzy. It was only a dream, he said to himself. "No it wasn't", said a nearby voice. "Your dreams will come *true*, Gerald". Gerald immediately realised who it was - his Fairy Game-Mother. "When? When will they come true?".... "Tomorrow", she replied, and disappeared.



The drawer opened... Gerald was picked up and put into the tape player, and slowly he began the long process of loading. Would this be the last time?.... Eventually he was in and running. But suddenly something stopped him in mid play - he was frozen! Then he felt himself spinning, faster and faster .... He was now on a floppy disk! Loading him in now took just a few seconds. He had a new lease of life... But how had this happened? The answer was simple... his owner had bought a **REPLAY**....

Access/Visa accepted on 0304 812276. Please state machine and DFS when ordering.

Please send me more details of REPLAY
Name:..
Address:..
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....................Postcode:...............................
Send to: Vine Micros Ltd, Marshborough, Sandwich, Kent. CT13 0PG. GG1

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the same way, but roundels can get 'damaged'. This doesn't affect the final print-out, but a 'repair' facility is provided to redraw them. Roundels can be added at this stage without going back to the component layout screen. Text can be added for either side of the board, in two sizes and four orientations.

Because the track design is stored as a simple screen RAM image, even a simple board takes up a lot of disc memory, but it also puts no limit on the number or complexity of tracks.

Auto-routing

Pineapple also offers an auto-routing add-on for *PCB*. This automatically draws in most of the circuit tracks for you. Like the main program, this too is in ROM. Although an extra, *PCB* was designed with auto-routing in mind and it fits in perfectly.

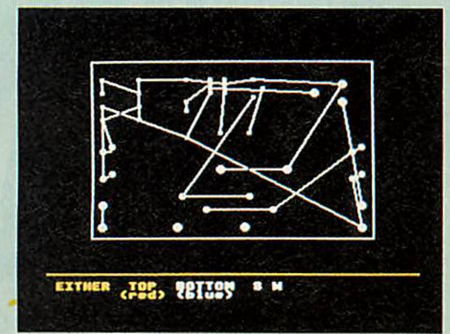
All the connections to be made are entered on the roundel-covered board. From each roundel the cursor is used to rubber band a line directly to where that pad is to be connected.

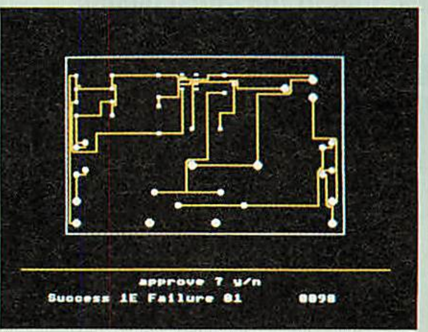
It is not easy to make all the connections correctly with a complex circuit. It must be worked through methodically to keep errors to a minimum. Some auto-routing systems produce a list of connections, with pre-defined labels for each pad, as a check. This one doesn't, so it is easy to miss a couple of connections. However, with practice fewer errors appear.

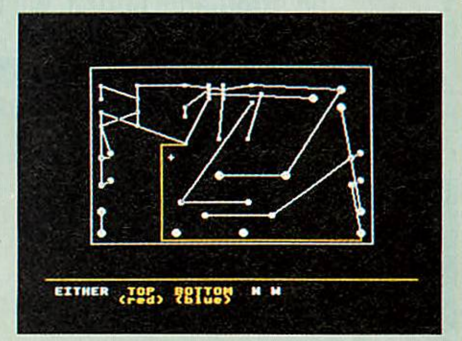
Each connection can be biased with a preference for positioning on or underneath the board or with equal weight to either. They can also be biased with a direction to start off the autorouting algorithms in the correct direction. Connections are edited by moving to an end point and pressing a function key to isolate one. This can then be deleted or the next connection selected.

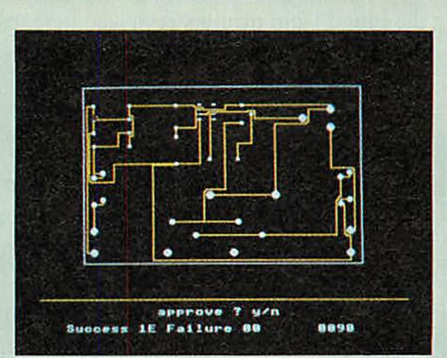
Once all connections are entered, pressing a function key starts the actual auto-routing. There is a choice of whether tracks can go between adjacent pins on chips, and whether the connections list is 'sorted' to bias east-west or north-south tracks.

The auto-routing process takes quite some time and draws as it calculates the tracks. Those it cannot manage it reports at the end, and if the routing is accepted these omissions can either be drawn in by hand, or rejected and the connections list rejigged for a better result. The auto-routing works in the same order as connections are entered, until all have been tried. Thus the initial order of the connections is important.









Components positioned on the layout screen (top left); adding connections for auto-routing (top right); the auto-routing program's first try – with one failure (middle left); adding the missing track manually (middle right); the final auto-routed layout (bottom left)

The ROM has its limitations. There is a limit of 190 connections, although a complex board could, in theory, be done in two sittings. And for each connection the program will not search a route outside a rectangle eight times the rectangle with the two connected points at its opposite corners. There is also a maximum rectangle of investigation of 3136 pixels – equivalent to a 3.7in × 3.7in square. Finally, the auto-route ROM always produces the same width of track (0.25in) with the same minimum spacing. However, thicker connections can always be added later, manually. Despite these constraints, *PCB Auto-route* is remarkable. No similar software comes near the price. Once designed, the PCB can be printed out. It is here that Pineapple's package beats all other low-cost PCB design software. Each part of the board can be printed – either of the two track masks or the component layout – either double-size or same-size, and in positive or negative form. The print-out routine is designed for any Epson-compatible printer with a quad density graphics mode. Other printers can be catered for by setting up the program with *commands. Plus there's an extra set of plotter drivers available.

The print-out is of a higher quality than the screen display. Close tracks which cannot be differentiated on the screen are clearly separated and the track corners and roundels are nicely rounded — important for high-frequency or high-voltage boards. The quad density print-out is dark and crisp enough for copying onto film for prototyping. Alternatively the print-out itself can be sprayed with a special 'transparentising' spray and used as the UV mask.

PCB cannot turn a BBC micro into a professional design workstation, but it does do all that the electronics enthusiast could reasonably ask. With the addition of the auto-routing software it becomes a powerful package which would not disgrace a small electronics manufacturer and is certainly a boon to any interested amateur.

Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL. Tel: 01-595 1476. PCB £85+VAT, PCB+Auto-route £185+VAT

GOING FOR QUALITY

The falling cost of 24-pin dot-matrix printers make them an affordable option. We test four of the latest models

Rob Miller and Graham Bell

Printers have come a long way since the now obsolete teletype machines clattered away in every computer installation. They printed around 10 characters per second at most. The comparison between them and today's dot-matrix and laser printers is on a par with comparing the first computer with an Archimedes. Printers can now sit quietly beside your computer and print out pages and pages in a matter of minutes.

Modern printers fall into one of three categories: daisywheel, dot-matrix and laser. The dot-matrix type is certainly the most common and the most versatile of these. An article explaining all three types of printer was published in the February '88 issue of *Acorn User.*

The cheapest dot-matrix printers are the 9-pin machines. These work at a relatively fast speed, often about 180 characters per second (cps), but produce a crude printout. You can generally tell when text has been printed out on 9-pins – the characters are formed with small dots and often look 'bitty'. Have a look at the yellow pages section in this magazine for an example. There are some 9-pins that have an NLQ (near letter quality) option. The text produced looks more like that produced on a typewriter, although it is still recognisable as 9-pin quality. The disadvantage is that NLQ is much slower than normal 'draft quality' printing – perhaps only 30 characters per second.

The more expensive 24-pin printers use their extra pins to give better output without sacrificing speed. The pins are smaller and spaced more closely, so the dots making up each letter are less obvious in the final print-out. The characters are comparable to those produced with a typewriter and are often referred to as letter quality – hence the LQ in the designation of the Epson LQ-800, the 'standard' 24-pin printer which we reviewed in November 1987. A compatibility chart containing details of the four 24-pin printers reviewed here, plus the LQ-800 and Epson GQ-3500 laser printer, is shown on page 45. The cost of these machines is falling rapidly at the moment; prices are now comparable with the cost of an equivalent 9-pin printer two years ago. The recommended prices are given at the end of the article, but normal shop prices are up to £100 lower.

The average quoted speed of the 24-pin machines reviewed here is about 80 cps, three time faster than a 9-pin printer in NLQ mode. Most of them also have a draft mode for doing rough copies, where the speed can be anything up to 250 cps.

As well as producing better quality text, the graphical resolution of a 24-pin printer is considerably better. As a result, this makes them a cheaper alternative to laser printers for basic desktop publishing work. If you go to the trouble of producing oversized work and then reducing it, high-quality graphical output can be achieved.

One of the best features of these printers was the paper parking; this is now fairly standard on the latest models. It allows single sheets of paper to be put in without removing the continuous stationery. Two buttons to press, and you can insert your letterhead paper, for example, using the friction feed. Meanwhile, the continuous stationery is wound out the back of the machine, but is still held on the tractor pins. To revert to continuous stationery, you just switch back to friction feed, lift the paper bail, and the paper is automatically wound in. All very easy.

A worry about the current crop of

PHOTOGRAPHS BY ANDREW CANTOURIS



Citizen HQP40: probably the best value

The typefaces used by each of the printers have slight differences. So we printed out a standard letter using the Courier font on each of the printers, using a new ribbon and standard business stationery. We then asked a sample of ten office workers which they preferred. Each ranked the four printers differently, but overall the preference was strongly for the Citizen's output. The Toshiba 3-in-1 ranked second, with the Panasonic and NEC holding up the rear. Two telling comments though: no-one would be dismayed at receiving a business letter printed on any of these printers. Many people strongly dislike the dotty nature of 9-pin printer output, but all of these were acceptable. But everyone preferred the fifth version of the standard letter, which came from an Epson GQ-3500 laser printer. Four sample printouts are shown in the boxes, with 9-pin NLQ and laser output for comparison.

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The favourite print-out among office workers



Toshiba 3-in-One, with optional sheet feeder

The typefaces used by each of the printers have slight differences. So we printed out a standard letter using the Courier font on each of the printers, using a new ribbon and standard business stationery. We then asked a sample of ten office workers which they preferred. Each ranked the four printers differently, but overall the preference was strongly for the Citizen's output. The Toshiba 3-in-1 ranked second, with the Panasonic and NEC holding up the rear. Two telling comments though: no-one would be dismayed at receiving a business letter printed on any of these printers. Many people strongly dislike the dotty nature of 9-pin printer output, but all of these were acceptable. But everyone preferred the fifth version of the standard letter, which came from an Epson GQ-3500 laser printer. Four sample printouts are shown in the boxes, with 9-pin NLQ and laser output for comparison.

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A stylish printer for business use



Larger and heavier: the KX-P1540 Panasonic

The typefaces used by each of the printers have slight differences. So we printed out a standard letter using the Courier font on each of the printers, using a new ribbon and standard business stationery. We then asked a sample of ten office workers which they preferred. Each ranked the four printers differently, but overall the preference was strongly for the Citizen's output. The Toshiba 3-in-1 ranked second, with the Panasonic and NEC holding up the rear. Two telling comments though: no-one would be dismayed at receiving a business letter printed on any of these printers. Many people strongly dislike the dotty nature of 9-pin printer output, but all of these were acceptable. But everyone preferred the fifth version of the standard letter, which came from an Epson GQ-3500 laser printer. Four sample printouts are shown in the boxes, with 9-pin NLQ and laser output for comparison.

The typefaces
each of the pr
have slight di
ences. So we

A reliable workhorse



Ungainly: the NEC, with optional sheet feeder

The typefaces used by each of the printers have slight differences. So we printed out a standard letter using the Courier font on each of the printers, using a new ribbon and standard business stationery. We then asked a sample of ten office workers which they preferred. Each ranked the four printers differently, but overall the preference was strongly for the Citizen's output. The Toshiba 3-in-1 ranked second, with the Panasonic and NEC holding up the rear. Two telling comments though: no-one would be dismayed at receiving a business letter printed on any of these printers. Many people strongly dislike the dotty nature of 9-pin printer output, but all of these were acceptable. But everyone preferred the fifth version of the standard letter, which came from an Epson GQ-3500 laser printer. Four sample printouts are shown in the boxes, with 9-pin NLQ and laser output for comparison.

The typefaces
each of the pr
have slight di
ences. So we

Not liked by the panel, but good value

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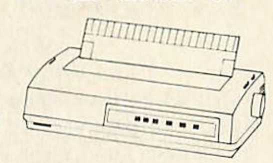
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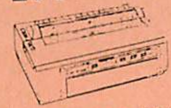
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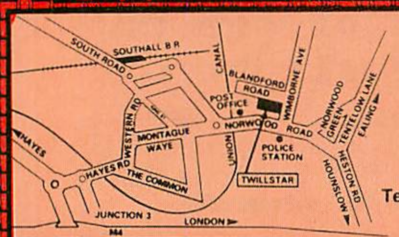
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24-pin printers is reliability. All the components are much smaller and finer than those in 9-pin models, and the pins are expected to move faster too. Some of the machines, notably the Citizen and NEC models, are very lightly constructed. It may be that they will not prove as reliable or long-lasting as similarly priced 9-pin models, but only time will tell. On this point, we'd appreciate comments from readers with similar machines.

Most printer reviews today seem to be just a collection of comparisons of the specifications between the machines, plus a few sample print-outs. For this review, each person in the *Acorn User* office was allocated a printer to use for about a month and has reported back on how they found it for daily use. The four printers reviewed here represent a fair cross-section of low to midprice 24-pin machines which are currently available.

The typefaces used by each of the printers have slight differences (see earlier boxes). We printed out a standard letter with the Courier font on each of the printers, using a new ribbon and standard

Citizen HQP-40	Toshiba P321SL	Panasonic KX-P1540	NEC P2200
35.5	26.5	19.5	18.5

Figure 1. Office poll results – points out of 50

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The typefaces u
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Figure 2. Dotty NLQ from 9-pin printers

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The typefaces u
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Figure 3. Preferred print-out: the laser printer

business stationery. We then asked a sample of 10 office workers which they preferred. Each ranked the four printers differently, but overall the preference was strongly for the Citizen's output, as summarised in figure 1.

The Toshiba ranked second, with the Panasonic and NEC holding up the rear. Two telling comments, though: no-one would be dismayed at receiving a business

CITIZEN HQP-40

The first step when using a new printer is connecting it to your computer. The HQP-40 comes with both parallel and serial interfaces as standard. This means that it can be used immediately with BBC B, Master 128, Compact and Archimedes computers. Electron users will have to add the Plus 1 to their machines. The connection sockets are located on the right-hand side at the front.

The HQP-40 has the most accessible dip switches I've ever seen in a printer. A simple press on the front panel opens a little door to reveal the whole set. Top marks for this!

The tractor mechanism is situated at the back of the printer. Paper can then be fed from a box beneath the printer and carried out behind (onto a shelf, say). This means the paper is pushed into the printer and then gripped by the carriage. The HQP-40 also allows the tractor mechanism to be adjusted. This lets paper be fed directly under the carriage and then pulled out, making it practically impossible for paper to misfeed.

For single sheets, there is an inbuilt feeder which automatically guides the paper through the necessary parts. I found this facility most useful. The auto-feeder can be turned off by disabling the paper sensor.

My main use for a printer is rough work (testing listings, etc) and letters. For letters, I normally switch from my dot-matrix printer to a second printer, a daisywheel. There are two reasons; first the quality and secondly, changing over from tractor-feed paper to single sheets can be fiddly. Using the HQP-40 eliminated both these problems. However, using the same computer to both work on and print from can cause a bottle-neck; you have to wait for the printer to finish before you can continue working. The HQP-40 overcomes this with its enormous 24k buffer (about 4000 words) that frees the computer almost immediately.

For graphics, the Citizen worked first time with *UserDump*, showing it can emulate the FX80 escape codes. It also works perfectly with the 24-pin dumps published in April and May's *Acorn User*. On the Arc, the LQ printer driver proved ideal with *First Word Plus*.

To sum up, I found the Citizen a delight to use.

Rob Miller

TOSHIBA P321SL

Of all the printers reviewed, the Toshiba 3-in-One P321SL was the most stylish. The version I had carried a sheet feeder with a single bin and I used it for a month with a Compact.

Putting it all together was fairly simple and then it was a matter of switching on the sheet feeder from the printer's front panel. I used the printer with an FX80 printer driver taken from our office network. This worked for simple bold and underscore, with a hash sign (#) used to get a pound (£). Trying to get fancy effects messed things up though, showing a lack of Epson-compatibility beyond the absolute basics when in Toshiba mode. It was also tested with *First Word Plus* on the Arc. Here the IBM Proprinter mode was used, with the US character set. This mode is far more compatible, as the table on page 45 shows. Pound signs can then be set up with a printer driver.

Three typefaces are provided as standard, and there is a quiet option. Choice of typeface is controlled from a calculator-like display on the front panel. This can be set up easily to present just the most frequently-changed options such as pitch, lines per inch, page length and so on. More obscure options can be obtained by going through a menu system. There are no dip switches. All three faces are attractive and readable.

The 3-in One on its own worked well. Continuous paper loads from the back and there's no wasting the first sheet as with the tractor feed. The sheet feeder proved reliable and easy to fit, and is turned on from the printer control panel. The one problem to appear was that the bold print blurred. This seemed to be because the paper bail rollers which normally hold paper are not used when the sheet feeder is in action, so paper can move fractionally before the second printing pass. This can be easily avoided by feeding sheets in singly.

We tested out the Toshiba with the Epson-compatible *Userdump* printer ROM. The lines per inch was set to 8 with no line feed, but we still got blank strips. This is because it is not Epson-compatible in the way it accepts 'ESC L' commands to set the line spacing.

Ribbons (at £10 each) and printheads were easy to remove and fit.

To sum up, pricey but nice.

Tony Quinn.

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letter printed on any of these printers. Many people dislike the dotty nature of 9-pin printer output (figure 2), but the print-out from all the review machines was acceptable. However, everyone preferred the sixth version of the standard letter, which came from an Epson GQ-3500 laser printer, shown in figure 3.

Each of the printers can also accept extra font cards, plugging into a slot on the side or rear. A couple of the printers tested offer a small selection of fonts in LQ mode, but for those who don't, font cards can be purchased separately.

As with the Epson LQ range, the 24-pin printers reviewed here (and some more modern 9-pin models too), can have problems with some graphics software. This arises because old Epson printers (for example the FX80) move the paper in multiples of 1/72nd or 1/214th of an inch. Newer printers have adopted 1/60th and 1/180th as the smallest units. This has most effect with graphics – old screen dumps won't work, as they leave gaps between each line of the picture. But other software is affected too – for example desktop publishing software such as *Stop Press* and even the Mayhew Telonics *Sciways* ROM. However, more and more new software is including support for 24-pin printers, so if you do buy one, keep a lookout for this.

Overall the Panasonic proved to be a robust printer, with easy-to-use controls. But it offered only a basic Courier font in letter quality, and this was generally disliked by our panel. The Citizen was a delight to use, with a large printer buffer built in and accessible dip switches. It emulated the Epson LQ-800 perfectly, and its version of Courier was chosen as the best by our panel. It probably represents the best value for home use.

The Toshiba offers the businessman a fine, stylish printer, with a sheet-feeder option that makes easy work of printing professional-looking letters. But it is quite expensive, and it is not Epson-compatible. Not recommended for home use.

In comparison, the NEC P2200 was flimsily built. It was the least liked of the models tested, and did poorly with the panel judging the quality of the print-out. However, it is by far the cheapest of this selection of printers, and offers good compatibility so is reasonable value for money.

Panasonic KX-P1540, £665. Citizen HQP-40, £499. NEC P2200, £395; sheet feeder, £67 (review model supplied by Twillstar Computers). Toshiba P321SL, £545; sheet feeder, £225.

PANASONIC KX-P1540

Panasonic's wide-carriage 24-pin printer was, in most circumstances, easy to use. It's solidly built, and is by far the largest and heaviest of the printers reviewed. The ability to print up to 136 columns of normal text is a real boon for business use – in particular for printing out spreadsheets. If you don't need this, then in the autumn, Panasonic will be producing a new style 80-column 24-pin printer too.

Connecting the KX-P1540 to a BBC micro or an Archimedes is easy – parallel and serial connections are standard.

The printer's front panel controls are very neat, and you can swap easily between draft and letter quality – even in the middle of a document. One problem with using wide-carriage printers arises when you put in narrow 9-inch paper; the printer can print off the edge of the paper onto the roller. Buttons on the front panel of the KX-P1540 allow you to set an absolute margin, beyond which the printer won't go, thus solving the problem. Plus there's a dip switch setting if you're using 9-inch paper all the time.

The printer seemed totally compatible with the Epson LQ command set, including its 24-pin graphics and it can emulate the IBM Proprinter too (useful if you use the Arc's IBM Emulator). Certainly it worked well with *View*, *Interword* and *First Word Plus* on the Arc. The Epson-LQ driver allowed graphics to be printed too. But the Panasonic worked perfectly with the three 24-pin dumps printed in *Acorn User* (Top of the List in the April and May issues). And it can emulate most FX80 8-pin graphics too, with the picture stretched vertically. it can't emulate the FX80's 'proportional' graphics mode, but proportional graphics can be done in 24-pin mode.

The ribbon is one of the easiest I've seen to replace. Good news on ribbon life too: once it dries out, you just push a button and it gets re-inked from a little foam pad inside the ribbon cartridge.

An annoying feature of the tractor feed is that paper coming out of the printer tends to get wound in again. All printers can do this, but the Panasonic tended to do it more than most. You certainly need to fit the wire rack at the back to make it reliable. Overall a robust workhorse, but expensive because it is a wide-carriage model.

Graham Bell

NEC P2200

After using an Epson RX80 manually fed printer I was looking forward to using the automatic feeding NEC P2200. Connecting it to my Compact was a simple task and I was ready to begin.

It isn't the most compact-looking printer I have ever seen; it stands high in comparison to others. And the quality of construction did not reach the quality of the others. Some of the components seemed flimsy, and wheels and levers always felt as if they were too flexible.

The sheet feeder, which was relatively easy to fit, makes the printer sit higher still. There is an adjustable paper guide fitted so that paper is not fed in crookedly, but the paper must be carefully fanned in the feeder tray so that it will be fed in one sheet at a time.

Single sheets may also be fed in by hand through a separate feeder behind a neat little 'removable' door on the front panel of the printer. This option ought to be handy for printing long letters, letterhead paper first and plain paper thereafter. But I found that paper tended to crumple when fed in this way. The tractor feed for continuous paper was reliable and caused no problems, and the ribbon proved simple to replace.

There is only a single font on the printer–Courier–in letter quality, plus there's a quicker and quieter draft mode for more general use. This can be selected via the switches on the front panel, though sometimes during the test they were unreliable. You can also select the character pitch. Optional font cartridges costing £33+VAT are available for other type styles.

I found no difficulty using the printer with *View*, or with *First Word Plus* on the Archimedes. Printer drivers made up for the Epson LQ printers worked well. As with the other 24-pin printers tested, the NEC wasn't totally happy with graphics software, often leaving gaps between lines of the picture. But it worked perfectly with special 24-pin screen dumps, and with all other software tested that offered LQ support. It appeared to be perfectly compatible with the 'standard' Epson LQ800.

To sum up, when I was used to the printer I found it relatively easy to use. But if buying one of my own I don't think I would choose this model.

Pauline McLernon

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____

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DTP

DESIGN THE FRONT PAGE

This new regular page from Tony Quinn will help all desktop publishing enthusiasts perfect their pages

The first thing that many people want to do with their page design system is to make a newspaper. Yet the result can be disappointing. Obviously, being limited to 10-inch printer paper is a problem. How many real newspapers do you know in that format? It is possible to paste pages together to make a longer sheet, but here are some tips for front pages without resorting to this.

Long-time *Acorn User* readers might remember two Abuser pages in 1985. In July that year, we did a page mimicking the *Daily Express,* and in September *The Sunday Times,* and I like to think we got the look about right, even on A4 paper. The vital part was copying the design techniques and typestyles of the real thing. We couldn't have the same number of columns, but using five columns instead of eight for the broadsheet version of *The Sunday Times* was enough. These pages were typeset in a very small size (8 point – normal *Acorn User* text is 10 point). This can't be done on BBC packages, so it's impractical to have more than four columns on a page. Even at this width you have to be careful that large gaps don't open up between words. Using short words and breaking words with hyphens by hand helps.

So divide up your standard page into four columns. These should give about 15 letters across a column with two-letter gutters in between. I used AMX *Stop Press* to get 16 characters per column using the 80-character font set at minimum size with 9 point depth. Add some markers down the side for quarter, third and half-page depths and you have a standard page grid. Then find out how many lines you get down the page. I got 47, plus the masthead. Print some of these grids out and use them to work out page designs with a pencil. It's then much easier to see what you're doing.

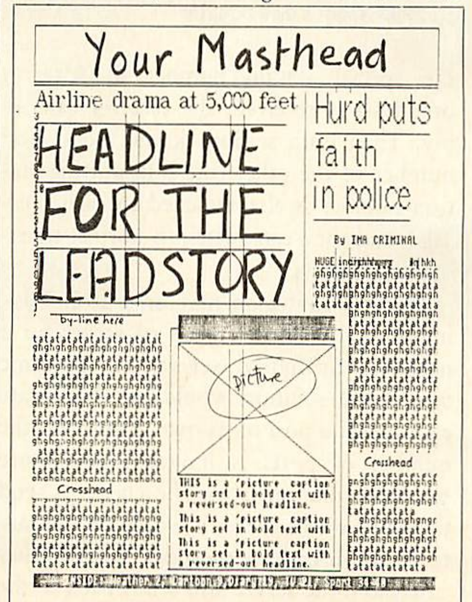
You'll see I've done a front page here in the style of the *Daily Mail,* although the typefaces are different. Note the detail around the change in column widths, and the rules. It's the overall design that counts and this was all worked out on paper first, right down to the depth of headlines, the spaces above and below them, and so on. The text is mostly gibberish and the pictures are irrelevant, although the shape of a photo or graphic will usually dictate the page design.

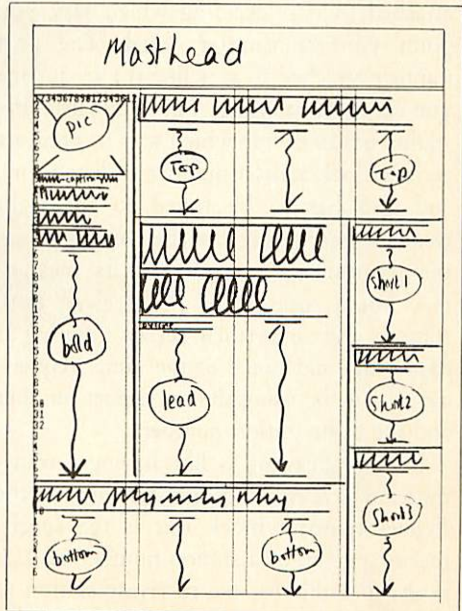
National papers are a special case of course, and their front pages are unique to the paper. A design style that is adopted by local and trade papers, and for inside pages on nationals, including broadsheets like *The Independent,* is called 'modular'. In this, stories form regular blocks, and it's used by papers and magazines – including *Acorn User.* Some examples and variations are shown here. Note how headline clashes are avoided by using pictures and how bold text adds vertical or horizontal stress. Also there should be space – called 'working white' – around headlines and they should not be cramped right on top of text. *The Guardian* is the greatest proponent of 'working white', although taking it to these lengths is a matter of taste.

Take a look at various papers, see how they compare and how you can copy a certain page design. You should be able to spot modular patterns, most often with variations. It is these variations and different use of type which persuades the eye that pages are very different, but if you start comparing papers daily, it should soon become clear how the patterns repeat, especially in the more disciplined papers such as the *Mail.* It's taken them years to settle on these shapes and styles, so don't ignore the lessons they carry.

If you've got any design or typography questions to ask, or if you just want to show us what you've done, write to Design Clinic, Acorn User, *20-26 Brunswick Place, London N1 6DJ.*







Mimicking the *Daily Mail* in *Stop Press* with guide rules for page left in place. Right, pencil sketch for modular page on standard grid

THE NETWORK PAGE

You can share a teletext receiver between several stations, with the help of this new communication protocol

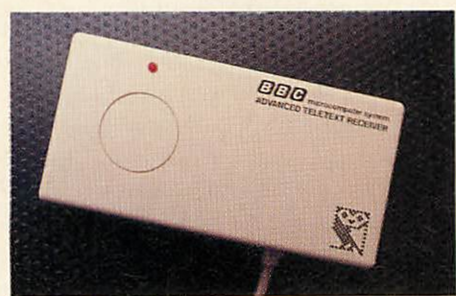
Alistair Shimmin

The Magnus Connection marketed by BP uses two Econet stations to model BP's personnel movement system. It simulates communication between onshore and offshore bases to track the location of workers. However, the main reason for station-to-station communication is usually to share a resource. We already have file-servers, printer-servers and, as described in the May issue of *Acorn User*, graphics-dump servers. But this article presents a new protocol, endorsed by both Acorn and SJ Research, for starting up station-to-station communication.

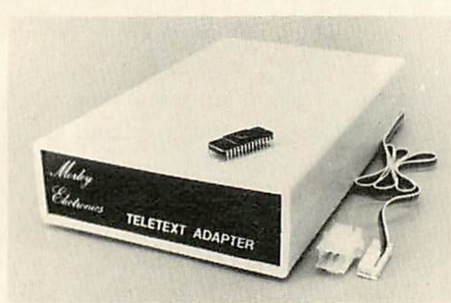
The best approach seems to be for the client to send out a 'Where are you server?' sort of message and get back an 'I'm here' message from the server. Econet provides an ideal method for performing such an operation. It allows a station to 'broadcast'. This is a short message which can be picked up by any station on a network, provided it is listening.

Before explaining this in detail it is probably best to say something about ports. Every message on the Econet has a port number and station number attached to ensure it arrives in the right place. In some ways it is rather like directional radio transmitters and receivers. When you transmit a message, the station number attached to it is deciding which way you point your transmitter aerial. The port number attached to it is like the frequency you are transmitting on. The listening station has to decide which way to point its aerial (which station number to listen for), and also has to be tuned to the right frequency (listening on the same port as the transmitting station sent its message on). For a message to be received both stations must have their aerials pointing at each other and tuned to the same frequency; that is, be using the same port number and the right station numbers.

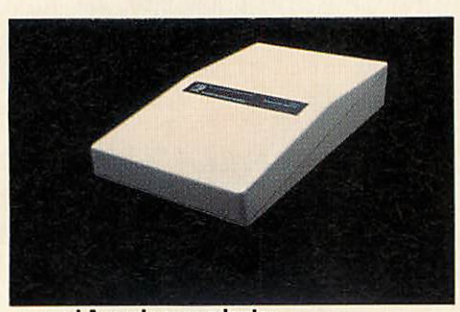
But broadcasting is like having a transmitter which emits in all directions. In the Econet transmit block this is the special meaning given to a station number of 0. It is also possible for the receiving station to listen for any other station, again by using the special station number 0. After a broadcast is received, the receiver can reply. Then both stations know the station number of the other (the transmitting station number is also attached to each message) and they can switch to normal transmit and receive.



The GIS teletext adapter . . .



. . . Morley Electronics' model . . .


. . . and Acorn's own adapter

Possible confusion may arise from having several different types of server on a network, or indeed several of the same type. One solution would be to allocate each server a port of its own. However, the number of ports is limited. So a more practical solution is for the client to send the name of the server it would like to talk to in the broadcast message. As a further extension, the server also sends back to the client the base port number on which further communication should take place. This is similar to the technique used by the file-server for transferring data.

The general method for a client to find a server is first to open a receive block on port &B1 for any station. The next step is to broadcast on port &B0 the name of the server you want, then poll the receive block until a reply has arrived. Read the reply to find the station number of the server and the base port on which further communication is to proceed.

The server should open a receive block on port &B0 for any station. When a message arrives, see if it contains this server's name. If not, reopen the receive block. If it does, transmit a message to the client on port &B1 specifying the base port on which further communication should take place. The full protocol for finding a server is shown in the box opposite.

The binary version number allows the client to intelligently select the most up-to-date server software if a choice is available. Server-dependent information which may be returned at data+3 could be some indication of how busy the server is, as this would again allow the client to select the most favourable server.

To illustrate the use of the agreed protocols, the network teletext server software broadcast frequently by the BBC has been modified. It remains essentially the same as the server software broadcast by Ceefax and available from the SJ User Group, but now conforms to the agreed 'find server' protocols. The system consists of three programs which start on the yellow pages and continue on page 123. First, a Basic program *TFS* which runs in the server machine with the teletext adaptor. Secondly, a machine code routine, *Code,* which is loaded at &900 by the program *TFS*. Thirdly, a machine code program *Teletext* which runs in the local machine, the client.

The *Teletext* program locates at &FFFF6F00 and so should not corrupt any but the longest Basic program in the client's memory. It will work with all versions of the BBC B, B+, Master 128, ET, Compact. To install the programs

place the *Teletext* program in $.LIBRARY. Here it can be used by anyone on the network by simply typing *TELETEXT. Put *TFS* and *Code* in a directory of their own. This might be the root directory of a separate user called TFS. If this user has a !BOOT file which CHAINs the *TFS* program, the whole system can be started by typing *I AM TFS. The machine running the *TFS* program must not use shadow screens or a second processor if the header is to be broadcast correctly, as it is peeked directly from the screen. An old BBC B is ideal for this application, just as it was for the graphics dump server described in May's *Acorn User*.

The first action of the *Teletext* client program is to open a receive block for the teletext server's reply. This receive block listens to all stations on port &B1, as at this stage the client does not know the station number of the server. It then broadcasts to all stations on port &B0 with a data field containing *Teletext*, this being the name to which the server will respond. The client then polls the receive block until a server responds or Escape is pressed.

When the server replies, the client reads the reply and stores the server's station number. The base port number (&B2) is used to calculate the port numbers to use for further communication. The client selects mode 7, prints the server's station number and the version number of the server software. Then the client opens three receive blocks: one on port &B5 (base+3) ready to receive any page headers which arrive, one on port &B2 (base) ready to receive any server replies, and one on port &B4 (base+2) to receive any pages.

The first request is for page 1100 – remember that the first digit indicates the channel number. This is on port &B3 (base+1) with a control byte of &81. The reply receive block is then polled until the server responds. The position in the queue returned by the server is printed at the bottom of the page, and a new receive block for replies is set up.

The client polls both port &B4 for a page and port &B5 for a header, until one or the other receives a transmission. If a page header is received, then the cursor is moved to the header position and it is printed out. An identical receive block is then set up to replace the one which has been used. Once a page is received, the first action is to test the control byte. If this is &80 then it indicates the page has been found and is in the receive block buffer ready to be transferred to the screen. If the control byte is &81 then this indicates some error has occurred and that an error message is in the receive block buffer waiting to be printed. A successfully received page is displayed and a new receive block for a page is set up. The header receive block continues to be polled and displayed until a key is pressed.

All the time the receive blocks are being polled, the client program also tests to see if a key has been pressed. If it has, this is taken to mean that you are about to request a new page. Most keys allow you to select a new page. If C is pressed, you can select a new channel, then a new page number. If Return is pressed, then the last page you requested is requested again. If R is pressed, then concealed parts of the page are revealed. Pressing R again conceals them. If * is pressed, then any star command can be entered. This allows you to *SAVE pages and so on.

The Escape flag is continually polled so that you can exit at any time. Pressing Escape sends a logoff instruction to the server which stops it looking for any more pages for you.

PROTOCOL FOR FINDING A SERVER

Client to Server	
port	&B0
control byte	undefined
data	name of the server in capitals padded with spaces to a length of eight char as ASCII data
Server to Client	
port	&B1
control byte	undefined
data	0 or error number
data+1	base port number for further exchanges
data+2	binary version number of the server software
data+3	server-dependent

One of the features of the normal use of teletext is that pages roll. For example, the cricket scores have more than one screen of information. These screens are displayed in sequence. An approximation to this facility is available from the server. Pressing S will enable the automatic rolling of sub-pages signalled with a high-pitched beep. Rolling can be disabled by pressing S again (with a low-pitched beep).

This implementation of sub-pages is a compromise, in that as more clients use this feature, the server will be overloaded. For this reason automatic rolling must be deliberately selected for every new page.

The *TFS* program makes as full use as possible of the ATS ROM's ability to search for several pages at once. The theoretical maximum is 20, but the size of the program limits this to about 10. The only real problem is that it is still only possible to search for pages on one channel at a time.

The approach adopted is to place a page request into one of four queues, one for each channel. If the number of pages in a queue exceeds the maximum number of pages for which the ATS ROM has space then a 'Channel busy' error will be returned. A record is also kept of the total number of pages requested and this is the queue position returned to the client – not the position in the queue for a particular channel. The way the ATS ROM works means that if you are third in the queue you may still receive your page before the client who is in first position. This is probably best illustrated by an example. Suppose these requests are issued:

Station 12 page 170 on channel 1
Station 14 page 400 on channel 4
Station 17 page 123 on channel 1

The *TFS* program will select channel 1, as this is the highest priority item in the queue. Now suppose that as it selects 1, the BBC is broadcasting page 112. The pages are broadcast almost in order. This means that station 17's page (123) will arrive before station 12's page (170). Thus station 17 will receive its page first even though it was third in the queue.

Overall the response time of the system is very fast, although it will obviously be slowed down if clients request non-existent pages. The cycle times for the different channels are important to the efficiency of the *TFS* program – this is the time it takes to broadcast all the teletext pages. As these times may be subject to change, they have been included in a DATA statement at the very end of the program. The first DATA statement is the fraction of the cycle time for which the *TFS* program will wait before sending a sub-page. This is currently 0.5. The second DATA statement consists of the cycle times for the four channels in hundredths of a second. They are currently set to 40 seconds each.

You will find in the protocols section over the page, a further non-teletext related call is included in the *TFS* server. This returns the value of the analogue ports, so that various devices can be attached to the analogue port of the server and can be sampled from anywhere on the network. At Wellington College, we are using this to monitor the outside temperature.

TELETEXT SERVER PROTOCOLS

All communications between teletext server and client are conducted on ports base-base+3 (currently &B2-&B5). Transmissions from client to server are on port &B3 and replies from the server are on port &B2. Port &B5 is reserved for broadcasting the current page number being picked up by the server and port &B4 is used for transmitting the page itself.

It is necessary to use four ports because the client may wish to have three receive blocks open at the same time: one to continually update the page header, one to request other information and one to receive the page itself. The page currently being received is broadcast on port &B5 and consists of four bytes:

Byte 1 Channel number in ASCII
Bytes 2-4 Page number in ASCII
All transmissions to the server will result in a reply being sent. It gives up if a 'Not listening' error occurs five times. There are two standard forms of reply.

- If an error has occurred (eg, you have requested a silly page number or channel number) then the first byte of the reply data will be an error number and the following byte will be an error message terminated by a carriage return.
- If no error has occurred, the first byte of the reply data will be zero and the subsequent bytes will be dependent on the call issued.

Read teletext server version number
Client to teleserver:

port	&B3
control byte	&80
data	nil

Teleserver to client:

port	&B2
control byte	&80
data	0 or error number
data+1	version number as character string ended by carriage return

Issue page request
Client to teleserver:

port	&B3
control byte	&81
data	channel number in ASCII
data+1-data+3	page number in ASCII

Teleserver to client:

port	&B2
control byte	&81
data	0 or error number
data+1	position in queue

Cancel page request
Client to teleserver:

port	&B3
control byte	&82
data	nil

Teleserver to client:

port	&B2
control byte	&82
data	0 or error number
data+1	nil

Read max users per channel
Client to teleserver:

port	&B3
control byte	&83
data	nil

Teleserver to client:

port	&B2
control byte	&83
data	0 or error number
data+1	max users

Read date and time
Client to teleserver:

port	&B3
control byte	&84
data	nil

Teleserver to client:

port	&B2
control byte	&84
data	0 or error number
data+1	time and date in ASCII (HH:MM:SSDD/MM/YYYY)

Logoff
Client to teleserver:

port	&B3
control byte	&85
data	nil

Teleserver to client:

port	&B2
control byte	&85
data	0 or error number
data+1	nil

Page request with time delay
Client to teleserver:

port	&B3
control byte	&86
data	channel number in ASCII
data+1-data+3	page number in ASCII

Teleserver to client:

port	&B2
control byte	&86
data	0 or error number
data+1	position in queue

Request port value
Client to teleserver:

port	&B3
control byte	&87
data	port number in range 0 to 3

Teleserver to client:

port	&B2
control byte	&87
data	0 or error number
data+1-data+2	port value

Reception of the teletext page The teletext server sends the page on port &B4. The control byte will be &80 if no error has occurred, otherwise the control byte will be &81. The only error that will occur will be a 'Timed out' error (ie, you have probably asked for a non-existent page). The data in the receive block buffer will be the page requested if there is no error, otherwise the data will be an error message terminated by a carriage return. If you successfully receive a page then locations &3FE into the receive block buffer will contain the sub-page number in BCD format. &3FE contains the hi-byte and &3FF contains the lo-byte.

Error numbers
Possible error numbers are:
1 Bad page number
2 Bad channel
3 Channel busy
4 Time unavailable
5 Bad port
If an error is received then an error message terminated by a carriage return will be returned in data+1.

The server's receive buffer is &50 bytes. It transmits a block of &400 bytes on port &B3 when transmitting a page and transmits a block of &20 bytes in all other cases.

◀ Network listing 2 continued from page 96

```
2790 IF FNpolltx<>0 THEN PRINT'"Not listening (";FNstation(st%);")";
2800 ENDPROC
2810 :
2820 DEF FNpolltx
2830 REPEAT
2840 A%=&32
2850 r%=(USR(osbyte) AND &FF00) DIV &100
2860 UNTIL r%<128
2870 =r%
2880 :
2890 DEF FNsetuprx(p%,st%,b%,l%)
2900 ?blk%=0
2910 blk%?1=&7F
2920 blk%?2=p%
2930 blk%!3=st%
2940 blk%!5=b%
2950 blk%!9=b%+l%
2960 X%=blk%:Y%=X% DIV 256:A%=&11
2970 CALL osword
2980 =?blk%
2990 :
3000 DEF FNpollrx(r%)
3010 A%=&33:X%=r%
3020 =USR(osbyte) AND &8000
3030 :
3040 DEF PROCreadrx(r%)
3050 ?blk%=r%
3060 X%=blk%:Y%=X% DIV 256:A%=&11
3070 CALL osword
3080 ENDPROC
3090 :
3100 DEF PROCnetwork
3110 IF FNpollrx(B%)>0 THEN PROCdealwithmessage
3120 IF FNpollrx(BB%)>0 THEN PROCdealwithfind
3130 ENDPROC
3140 :
3150 DEF PROCdealwithfind
3160 PROCreadrx(BB%)
3170 logon%?8=13
3180 IF $logon%=server$ THEN PROCtxserverinfo
3190 BB%=FNsetuprx(findserverport,0,logon%,8)
3200 ENDPROC
3210 :
3220 DEF PROCtxserverinfo
3230 station%=blk%!3 AND &FFFF
3240 PRINT'FNstation(station%);TAB(8);"--FIND SERVER--";
3250 ?logon%=0
3260 logon%?1=&B2
3270 logon%?2=binvers%
3280 $(logon%+3)=server$
3290 logon%?11=0
3300 $(logon%+12)=version$
3310 PROCtx(serverresponseport,&80,station%,logon%,&20)
3320 ENDPROC
3330 :
3340 DEF PROCdealwithmessage
3350 PROCreadrx(B%)
3360 station%=blk%!3 AND &FFFF
3370 control%=blk%?1
3380 !data%=!message%
3390 PRINT'FNstation(station%);TAB(8);"CODE:";~control%;"  ";
3400 IF control%=&81 THEN PROCrequestpage(FALSE,&81)
3410 IF control%=&80 THEN PROCversion
3420 IF control%=&82 THEN PROCcancel
3430 IF control%=&83 THEN PROCmaxusers
3440 IF control%=&84 THEN PROCtime
3450 IF control%=&85 THEN PROClogoff
3460 IF control%=&86 THEN PROCrequestpage(TRUE,&86)
3470 IF control%=&87 THEN PROCtemp
3480 B%=FNsetuprx(serverinport,0,message%,&50)
3490 ENDPROC
3500 :
3510 DEF FNstation(stno%)
3520 net$=FNformat(3,stno% DIV 256)+"."
3530 =net$+FNformat(3,stno% MOD 256)
3540 :
3550 DEF FNformat(z%,form%)
3560 form$=STR$(form%)
3570 =STRING$(z%-LEN(form$),"0")+form$
3580 :
3590 DEF PROCmaxusers
3600 PRINT"Max users";
3610 ?message%=0
3620 message%?1=maxchanpage%
3630 PROCtx(serveroutport,&83,station%,message%,2)
3640 ENDPROC
3650 :
3660 DEF PROCtemp
3670 port%=?data%
3680 PRINT"Request port ";port%;
3690 IF port%<0 OR port%>3 THEN PROCerror(&87,5,"Bad port"):ENDPROC
3700 ?message%=0
3710 message%!1=ADVAL(port%)
3720 PROCtx(serveroutport,&87,station%,message%,3)
3730 ENDPROC
3740 :
3750 DEF PROCaddarecord
3760 result%=FNalready(num%(Ch%)-1,page%(Ch%),num%(Ch%)))
3770 IF result%=-1 THEN PROCunique(num%(channel%)) ELSE PROCnotunique(num%(channel%),result%)
3780 ENDPROC
3790 :
3800 DEF PROCversion
3810 PRINT"Version number";
3820 ?message%=0
3830 $(message%+1)=version$
3840 PROCtx(serveroutport,&80,station%,message%,&20)
3850 ENDPROC
3860 :
3870 DEF PROCtimeanddate
3880 now%=TIME-lastupdate%
3890 hrs$=FNformat(2,(hrs%+((now%+100*secs%+6000*mins%) DIV 360000))MOD 24)
3900 mins$=FNformat(2,(mins%+((now%+100*secs%) DIV 6000))MOD 60)
3910 secs$=FNformat(2,(secs%+(now% DIV 100))MOD 60)
3920 time$=hrs$+":"+mins$+":"+secs$+date$
3930 ?message%=0
3940 $(message%+1)=time$
3950 PROCtx(serveroutport,&84,station%,message%,22)
3960 ENDPROC
3970 :
3980 DEF PROCgettimeanddate
3990 *CH1
4000 IF queue%=0 THEN TIME=0
4010 notime%=FALSE
4020 PROCdelay(150)
4030 PROCcall(21)
4040 lastupdate%=TIME
4050 IF blk%?10=&FF THEN notime%=TRUE:ENDPROC
4060 blk%?3=13:blk%?6=13:blk%?9=13
4070 hrs%=VAL($(blk%+1))
4080 mins%=VAL($(blk%+4))
4090 secs%=VAL($(blk%+7))
4100 PROCcall(15)
4110 tenthousands=(10*(blk%?8 AND &F0) DIV &10)+(blk%?8 AND &F)
4120 thousands=(blk%?9 AND &F0) DIV &10
4130 hundreds=blk%?9 AND &F
4140 tens=(blk%?10 AND &F0) DIV &10
4150 units=blk%?10 AND &F
4160 jd=10000*tenthousands+1000*thousands+100*hundreds+10*tens+units
4170 y1=(100*(jd-15078.2))DIV 36525
4180 m1=INT((jd-14956.1-INT(365.25*y1))/30.6001)
4190 IF m1<14 THEN k=0 ELSE k=1
4200 days%=jd-14956-INT(365.25*y1)-INT(30.6*m1)
4210 months%=m1-1-12*k
4220 years%=y1+k
4230 date$=FNformat(2,days%)+"/"+FNformat(2,months%)+"/"+FNformat(4,years%+1900)
4240 ENDPROC
4250 :
4260 DEF PROCnotime
4270 ?message%=4
4280 $(message%+1)="Time unavailable"
4290 PROCtx(serveroutport,&84,station%,message%,22)
4300 ENDPROC
4310 :
```

Continued ▶

◀ Network Page listing 2 continued

```
 4320 DEF PROCtime
 4330 PRINT"Request time";
 4340 IF notime%=TRUE THEN PROCnotime ELSE PR
OCtimeanddate
 4350 ENDPROC
 4360 :
 4370 DEF FNchannel
 4380 PROCcall(0)
 4390 =(blk%?1)+1
 4400 :
 4410 DEF FNlegal(char%)
 4420 IF char%<32 THEN char%=255
 4430 =char%
 4440 :
 4450 DEF PROCrequestpage(roll%,byte%)
 4460 page$=CHR$(FNlegal(data%?1))+CHR$(FNleg
al(data%?2))+CHR$(FNlegal(data%?3))
 4470 page%=VAL(page$)
 4480 channel%=?data%-48
 4490 PRINT"Request page ";page$;" on ";chann
el%;
 4500 page$=CHR$(data%?1)+CHR$(data%?2)+CHR$(
data%?3)
 4510 PROCcheckmatchingsts
 4520 IF channel%<1 OR channel%>4 THEN PROCer
ror(byte%,2,"Bad channel"):ENDPROC
 4530 IF page%<100 THEN PROCerror(byte%,1,"Ba
d page number"):ENDPROC
 4540 IF num%(channel%)=19 THEN PROCerror(byt
e%,3,"Channel busy"):ENDPROC
 4550 IF (Ch%=channel%) AND (FNfreerecord(pag
e%)=maxchanpage%) THEN PROCerror(byte%,3,"Cha
nnel busy"):ENDPROC
 4560 IF (Ch%<>channel%) AND (num%(channel%)=
maxchanpage%) THEN PROCerror(byte%,3,"Channel
 busy"):ENDPROC
 4570 num%(channel%)=num%(channel%)+1
 4580 queue%=queue%+1
 4590 request%=request%+1
 4600 station%(channel%,num%(channel%))=stati
on%
 4610 page%(channel%,num%(channel%))=page%
 4620 requestpriority%(channel%,num%(channel%
))=request%
 4630 requesttime%(channel%,num%(channel%))=T
IME
 4640 rollflag%(channel%,num%(channel%))=roll
%
 4650 marker%=request%
 4660 IF Ch%=channel% THEN PROCaddarecord
 4670 ?message%=0
 4680 message%?1=queue%
 4690 PROCtx(serveroutport,byte%,station%(cha
nnel%,num%(channel%)),message%,&20)
 4700 ENDPROC
 4710 :
 4720 DEF PROCcancel
 4730 PRINT"Cancel pages";
 4740 PROCtx(serveroutport,&82,station%,messa
ge%,1)
 4750 PROCcheckmatchingsts
 4760 ENDPROC
 4770 :
 4780 DEF PROClogoff
 4790 PRINT"Logoff";
 4800 PROCtx(serveroutport,&85,station%,messa
ge%,1)
 4810 PROCcheckmatchingsts
 4820 ENDPROC
 4830 :
 4840 DEF PROCcheckmatchingsts
 4850 chan%=0
 4860 REPEAT
 4870 chan%=chan%+1
 4880 item%=0
 4890 REPEAT
 4900 item%=item%+1
 4910 IF FNdrop THEN PROCreorder(item%,chan%)
:item%=item%-1
 4920 UNTIL item%>=num%(chan%)
 4930 UNTIL chan%=4
 4940 ENDPROC
 4950 :
 4960 DEF FNdrop
 4970 IF station%(chan%,item%)=station% THEN
=TRUE
 4980 =FALSE
 4990 :
 5000 DEF PROCerror(con%,err%,err$)
 5010 ?message%=err%
 5020 $(message%+1)=err$
```

Continued ▶

◀ Network Page listing 2 continued

```
 5030 PRINT'"ERROR : ";$(message%+1);
 5040 PROCtx(serveroutport,con%,station%,mess
age%,&20)
 5050 ENDPROC
 5060 :
 5070 *FX 13,5
 5080 *HOFF
 5090 *TTXOFF
 5100 REPORT:PRINT" at line ";ERL
 5110 END
 5120 DATA 0.5
 5130 DATA 4000,4000,4000,4000
```

Listing 3. *TELETEXT source code

```
   10 REM Client *TELETE
XT source
   20 REM by Alistair Sh
immin
   30 REM for BBC B/B+/M
/C
   40 REM (c) Acorn User
 August 1988
   50 :
   60 MODE 7
   70 HIMEM=&6E00
   80 findserverport=&B0
   90 serverresponseport
=&B1
  100 eventtime=20
  110 *KEY 0 CALL code%|
M
  120 oscli=&FFF7
  130 osrdch=&FFE0
  140 osasci=&FFE3
  150 oswrch=&FFEE
  160 osword=&FFF1
  170 osbyte=&FFF4
  180 osargs=&FFDA
  190 osnewl=&FFE7
  200 brkv=&202
  210 printptr=&A8
  220 code%=&6E00
  230 :
  240 FOR pass=0 TO 3 ST
EP 3
  250 P%=code%
  260 [OPT pass
  270 .exec
  280 LDY #0
  290 LDA #2
  300 LDX #printptr
  310 JSR osargs
  320 STA nfsflag
  330 CMP #2
  340 BNE dnfs
  350 LDA #1
  360 JSR osargs
  370 LDY #255
  380 .spaceskip
  390 INY
  400 LDA (printptr),Y
  410 CMP #13
  420 BEQ default
  430 CMP #32
  440 BNE spaceskip
  450 .spaceskip2
  460 INY
  470 LDA (printptr),Y
  480 CMP #32
  490 BEQ spaceskip2
  500 CMP #13
  510 BEQ default
  520 JMP continue
  530 :
  540 .dnfs
  550 LDA #1
  560 JSR osargs
  570 LDY #0
  580 LDA (printptr),Y
  590 CMP #13
  600 BEQ default
  610 JMP continue
  620 :
  630 .default
  640 JMP broadcastforse
rver
  650 .continue
  660 LDA #1
  670 STA flagspecific
  680 JSR entrytonumber
  690 STA specifictx+2
  700 STA rxserverblk+3
  710 JMP broadcastforse
rver
  720 .entrytonumber
  730 .number
  740 LDA (printptr),Y
  750 CMP #13
  760 BEQ endnumber
  770 CMP #32
  780 BEQ endnumber
  790 CMP #ASC"."
  800 BEQ netnum
  810 SEC
  820 SBC #48
  830 CMP #10
  840 BCS badnumber
  850 LDX #10
  860 .multloop
  870 CLC
  880 ADC numberstore
  890 BCS badnumber
  900 DEX
  910 BNE multloop
  920 STA numberstore
  930 INY
  940 JMP number
  950 .endnumber
  960 LDA numberstore
  970 BEQ badnumber
  980 RTS
  990 .badnumber
 1000 BRK
 1010 OPT FNequb(11)
 1020 OPT FNequs("Bad st
ation")
 1030 BRK
 1040 .netnum
 1050 BIT dot
 1060 BMI badnumber
 1070 LDA numberstore
 1080 STA specifictx+3
 1090 STA rxserverblk+4
 1100 LDA #0
 1110 STA numberstore
 1120 DEC dot:INY
 1130 JMP number
 1140 .numberstore OPT F
Nequb(0)
 1150 .dot OPT FNequb(0)
 1160 :
 1170 .broadcastforserve
r
 1180 LDX #localnumber M
OD 256
 1190 LDY #localnumber D
IV 256
 1200 LDA #&13:JSR oswor
d
 1210 JSR printtext
 1220 OPT FNequs("Trying
 to find TELE-SERVER")
 1230 BRK
 1240 .findagainloop
 1250 JSR setupfindserve
rreplyrx
 1260 .logonloop
 1270 LDA flagspecific
 1280 BEQ notuserspecifi
ed
 1290 JSR setupfindtx
 1300 JSR calltx
```

Continued ▶

◀ Network Page listing 3 continued

```
1310 JMP andnowpoll
1320 .notuserspecified
1330 JSR broadcast
1340 .andnowpoll
1350 JSR polltx
1360 BIT &FF
1370 BPL noescapepress
1380 JSR delete
1390 BRK
1400 OPT FNequb(&11)
1410 OPT FNequs("Escape")
1420 BRK
1430 .wait
1440 LDX #timeset MOD 256
1450 LDY #timeset DIV 256
1460 LDA #2
1470 JSR osword
1480 .delayloop
1490 LDX #timeread MOD 256
1500 LDY #timeread DIV 256
1510 LDA #1
1520 JSR osword
1530 LDA timeread
1540 CMP #30
1550 BCC delayloop
1560 LDA localnumber+1
1570 STA timedelay
1580 .timedelayloop
1590 DEC timedelay
1600 BNE timedelayloop
1610 RTS
1620 .noescapepress
1630 JSR wait
1640 LDX rxno2
1650 JSR pollrx
1660 CMP #&80
1670 BCC logonloop
1680 LDA rxno2
1690 STA rxblk
1700 JSR readrx
1710 LDX #0
1720 .testnameloop
1730 LDA buffer+3,X
1740 CMP specificfindserver,X
1750 BNE wrongserver
1760 INX:CPX #8
1770 BEQ rightserver
1780 JMP testnameloop
1790 .wrongserver
1800 JMP findagainloop
1810 .rightserver
1820 LDA rxblk+4
1830 STA st+1
1840 LDA rxblk+3
1850 STA st
1860 LDA buffer
1870 BEQ noerrorfromserver
1880 STA logonerror+1
1890 .logonerror
1900 BRK
1910 OPT FNequb(0)
1920 OPT FNequs("Server error")
1930 BRK
1940 .noerrorfromserver
1950 LDA buffer+1
1960 STA serverreplyport
1970 CLC:ADC #1
1980 STA pagerequestport
1990 CLC:ADC #1
2000 STA pagereceiveport
2010 CLC:ADC #1
2020 STA pageheaderport
2030 LDX #2:LDA #4
2040 JSR osbyte
2050 SEI
2060 LDA &220
2070 STA oldeventvector
2080 LDA &221
2090 STA oldeventvector+1
2100 CLI
2110 LDA #headerevent MOD 256
2120 STA &220
2130 LDA #headerevent DIV 256
2140 STA &221
2150 LDA brkv:STA brkstore
2160 LDA brkv+1
2170 STA brkstore+1
2180 LDA #brk MOD 256
2190 STA brkv
2200 LDA #brk DIV 256
2210 STA brkv+1
2220 LDA #22:JSR oswrch
2230 LDA #7:JSR oswrch
2240 JSR printtext
2250 OPT FNequs("C1 P100")
2260 BRK
2270 LDA #31:JSR oswrch
2280 LDA #24:JSR oswrch
2290 LDA #24:JSR oswrch
2300 JSR printtext
2310 OPT FNequs("Server ")
2320 BRK
2330 LDA st+1
2340 BEQ suppressnetnum
2350 JSR printdecimal
2360 LDA #46:JSR oswrch
2370 .suppressnetnum
2380 LDA st
2390 JSR printdecimal
2400 LDA #31:JSR oswrch
2410 LDA #24:JSR oswrch
2420 LDA #0:JSR oswrch
2430 LDA #14:LDX #5
2440 JSR osbyte
2450 JSR settimeback
2460 JSR printtext
2470 OPT FNequs("Version ")
2480 BRK
2490 LDX #0
2500 .versloop
2510 LDA buffer+12,X
2520 CMP #13
2530 BEQ exitvers
2540 JSR oswrch
2550 INX
2560 JMP versloop
2570 .exitvers
2580 JSR cursoroff
2590 JSR setupheaderrx
2600 JSR firstaskforpage
2610 .testpagearrived
2620 JSR testescape
2630 LDX #0:LDY #0
2640 LDA #&81
2650 JSR osbyte
2660 CPY #0
2670 BNE nochar
2680 JSR testcharinput
2690 .nochar
2700 LDX rxno
2710 JSR pollrx
2720 CMP #&80
2730 BCC testpagearrived
2740 LDA #1
2750 STA gotfirstpage
2760 LDA #7:JSR oswrch
2770 LDA rxno
2780 STA rxblk
2790 JSR readrx
2800 LDA rxblk+1
2810 CMP #&80
2820 BEQ noerror
2830 JSR cursorbottom
2840 LDX #0
2850 .printerrorloop
2860 LDA buffer,X
2870 CMP #13
2880 BEQ exiterror
2890 JSR oswrch:INX
2900 JMP printerrorloop
2910 .exiterror
2920 LDA #7:JSR oswrch
2930 LDA #1
2940 STA errorflag
2950 LDX #0
2960 JSR testcharinput
2970 JMP testpagearrived
2980 .noerror
2990 JSR displaypage
3000 LDA rollflag
3010 BEQ noroll1
3020 JSR returnpressed
3030 .noroll1
3040 LDX #0
3050 JMP testpagearrived
3060 .headerevent
3070 PHP
3080 CMP #5
3090 BNE notourevent
3100 PHA:TYA:PHA:TXA:PHA
3110 LDA #&86
3120 JSR osbyte
3130 STX pos:STY vpos
3140 LDX rxno1
3150 JSR pollrx
3160 CMP #&80
3170 BCC noheader
3180 LDA rxno1
3190 STA rxblk
3200 JSR readrx
3210 LDA #31:JSR oswrch
3220 LDA #15:JSR oswrch
3230 LDA #0:JSR oswrch
3240 LDA nfsflag
3250 CMP #2
3260 BEQ oldnfsheader
3270 LDX #0
3280 .headprintloop
3290 LDA header+1,X
3300 JSR oswrch
3310 INX
3320 CPX #3
3330 BNE headprintloop
3340 JSR setupheaderrx
3350 JMP noheader
3360 .oldnfsheader
3370 LDX #0
3380 .oldheaderloop
3390 LDA rxblk+6,X
3400 JSR oswrch
3410 INX:CPX #3
3420 BNE oldheaderloop
3430 JSR setupheaderrx
3440 .noheader
3450 JSR settimeback
3460 LDA #31:JSR oswrch
3470 LDA pos:JSR oswrch
3480 LDA vpos:JSR oswrch
3490 PLA:TAX:PLA:TAY:PLA
3500 .notourevent
3510 PLP
3520 JMP (oldeventvector)
3530 .settimeback
3540 LDX #tb MOD 256
3550 LDY #tb DIV 256
3560 LDA #4:JSR osword
3570 RTS
3580 .pos OPT FNequb(0)
3590 .vpos OPT FNequb(0)
3600 .oldeventvector OPT FNequw(0)
3610 .gotfirstpage OPT FNequb(0)
3620 .indexflag OPT FNequb(0)
3630 .errorflag OPT FNequb(0)
3640 .firstaskforpage
3650 JSR askforpage
3660 RTS
3670 .brk
3680 JSR osnewl
3690 LDY #0
3700 .errloop
3710 INY:LDA (&FD),Y
3720 BEQ exiterr
3730 JSR oswrch
3740 JMP errloop
3750 .exiterr
3760 LDA #&7C
3770 JSR osbyte
3780 LDX stackstore:TXS
3790 JSR osnewl
3800 JMP returnfromerror
3810 .displaypage
3820 LDA #12
3830 JSR oswrch
3840 JSR home
3850 LDA #buffer MOD 256
3860 STA &A8
3870 LDA #buffer DIV 256
3880 STA &A9
3890 LDA #3:STA &AB
3900 LDA #&E6:STA &AA
3910 LDY #0
3920 .displayloop
3930 LDA #1
3940 STA indexflag
3950 LDA (&A8),Y
3960 CMP #32
3970 BCS nobadchar
3980 LDA #32
3990 .nobadchar
4000 JSR oswrch
4010 CLC:LDA &A8
4020 ADC #1:STA &A8
4030 LDA &A9:ADC #0
4040 STA &A9:SEC
4050 LDA &AA:SBC #1
4060 STA &AA:LDA &AB
4070 SBC #0:STA &AB
4080 BPL displayloop
4090 JSR home
4100 LDA #67:JSR oswrch
4110 LDA pageinput:JSR oswrch
4120 LDA #32:JSR oswrch
4130 LDA #80:JSR oswrch
4140 LDX #0
4150 .currentpageloop
4160 INX:LDA pageinput,X
4170 JSR oswrch
4180 CPX #3
4190 BNE currentpageloop
4200 LDA #1:STA gotpage
4210 RTS
4220 .isr
4230 LDA #13:LDX #5
4240 JSR osbyte
4250 LDA #21:LDX #0
4260 JSR osbyte
4270 LDA #23
4280 STA linecount
4290 .revealloop
4300 LDA #38:STA xline
4310 .inrloop
4320 LDA #31:JSR oswrch
4330 LDA xline
4340 JSR oswrch
4350 LDA linecount
4360 JSR oswrch
4370 LDA #&87
4380 JSR osbyte
4390 CPX #152
4400 BNE noconceal
4410 LDA #32:JSR oswrch
4420 JMP nohide
4430 .noconceal
4440 CPX #32:BNE nohide
4450 LDA #152:JSR oswrch
4460 .nohide
4470 DEC xline
4480 BPL inrloop
4490 DEC linecount
4500 BNE revealloop
4510 LDA #14:LDX #5
4520 JSR osbyte
4530 JSR settimeback
4540 RTS
4550 .isstar
4560 JSR cursorbottom
```

Continued ▶

◀ Network Page listing 3 continued

```
4570 .isanotherstar
4580 LDA #42:JSR oswrch
4590 LDX #star MOD 256
4600 LDY #star DIV 256
4610 LDA #0:JSR osword
4620 BCS starescape
4630 LDA #13:LDX #5
4640 JSR osbyte
4650 TSX:STX stackstore
4660 LDX #starbuff MOD
256
4670 LDY #starbuff DIV
256
4680 JSR oscli
4690 .returnfromerror
4700 JSR osnewl
4710 JSR cursoroff
4720 JSR printtext
4730 OPT FNequs("Press
any key")
4740 BRK
4750 JSR osrdch
4760 CMP #42
4770 BNE notanotherstar
4780 JSR cursorbottom
4790 LDA #13:LDX #5
4800 JSR osbyte
4810 JMP isanotherstar
4820 .notanotherstar
4830 .starescape
4840 LDA gotfirstpage
4850 BEQ stillonpage1
4860 LDX rxno
4870 JSR pollrx
4880 CMP #&80
4890 BCS willdisplayany
way
4900 JSR displaypage
4910 .willdisplayanyway
4920 .stillonpage1
4930 LDA #&7C:JSR osbyt
e
4940 LDA #14:LDX #5
4950 JSR osbyte
4960 JSR settimeback
4970 RTS
4980 .isc
4990 LDA #21:LDX #0
5000 JSR osbyte
5010 LDA #0
5020 STA errorflag
5030 .anothertry
5040 JSR home
5050 LDA #9:JSR oswrch
5060 LDA #32:JSR oswrch
5070 LDA #8:JSR oswrch
5080 LDX #cinput MOD 25
6
5090 LDY #cinput DIV 25
6
5100 LDA #0:JSR osword
5110 BCS wasanescape1
5120 LDA channelinput
5130 CMP #ASC"5"
5140 BCS anothertry
5150 CMP #ASC"1"
5160 BCC anothertry
5170 STA pageinput
5180 JMP andnowpage
5190 .wasanescape1
5200 JMP testescape
5210 .isr1
5220 JMP isr
5230 .isstar1
5240 JMP isstar
5250 .isS
5260 LDA #1
5270 EOR rollflag
5280 STA rollflag
5290 PHP
5300 BEQ low
5310 LDA #&D5:LDX #150
5320 LDY #0:JSR osbyte
5330 JMP high
5340 .low
5350 LDA #&D5:LDX #50
5360 LDY #0:JSR osbyte
5370 .high
5380 LDA #7:JSR oswrch
5390 LDA #&D5:LDX #101
5400 LDY #0:JSR osbyte
5410 PLP
5420 BEQ notoktoroll
5430 LDA gotpage
5440 BNE oktoroll
5450 .notoktoroll
5460 RTS
5470 .isc1
5480 JMP isc
5490 .testcharinput
5500 CPX #42:BEQ isstar
1
5510 CPX #82:BEQ isr1
5520 CPX #114:BEQ isr1
5530 CPX #83:BEQ isS
5540 CPX #115:BEQ isS
5550 CPX #13:BNE noretu
rnpressed
5560 LDA gotpage
5570 BNE oktoreturn
5580 RTS
5590 .oktoreturn
5600 LDA #0:STA rollfla
g
5610 .oktoroll
5620 JMP returnpressed
5630 .noreturnpressed
5640 TXA:PHA
5650 LDA errorflag
5660 BNE noneedtocancel
pages
5670 PLA:TAY:PHA
5680 LDA #138:LDX #0
5690 JSR osbyte
5700 JSR cancelpage
5710 LDA #0
5720 STA rollflag
5730 .noneedtocancelpag
es
5740 LDX rxno
5750 LDA #&34
5760 JSR osbyte
5770 PLA
5780 CMP #67:BEQ isc1
5790 CMP #99:BEQ isc1
5800 LDA errorflag:PHA
5810 BEQ noerrorflag
5820 LDA #21:LDX #00
5830 JSR osbyte
5840 PLA:CMP #2
5850 BNE notchannelerro
r
5860 JMP isc
5870 .notchannelerror
5880 LDA #0:PHA
5890 .noerrorflag
5900 PLA
5910 STA errorflag
5920 .andnowpage
5930 LDA #0:STA rollfla
g
5940 JSR home
5950 JSR printtext
5960 OPT FNequs("
")
5970 BRK
5980 LDA indexflag
5990 BNE skipblanks
6000 JSR printtext
6010 OPT FNequs("
")
6020 BRK
6030 .skipblanks
6040 JSR home
6050 LDA #67:JSR oswrch
6060 LDA pageinput
6070 JSR oswrch
6080 LDA #32:JSR oswrch
6090 LDA #80:JSR oswrch
6100 LDX #input MOD 256
6110 LDY #input DIV 256
6120 LDA #0:JSR osword
6130 BCS wasanescape
6140 JSR cursorbottom
6150 .returnpressed
6160 JSR askforpage
6170 RTS
6180 .wasanescape
6190 JMP testescape
6200 .setuptx
6210 LDX #11
6220 .txloop
6230 LDA reqpage,X
6240 STA txblk,X
6250 DEX:BPL txloop
6260 RTS
6270 .setupfindtx
6280 LDX #11
6290 .txfindloop
6300 LDA specifictx,X
6310 STA txblk,X:DEX
6320 BPL txfindloop
6330 RTS
6340 .cancelpage
6350 LDA #&82
6360 STA reqpage
6370 JSR transmitandget
reply
6380 RTS
6390 .logoff
6400 LDA #&85
6410 STA reqpage
6420 JSR transmitandget
reply
6430 RTS
6440 .askforpage
6450 LDA #&81
6460 STA reqpage
6470 JSR setuppagerx
6480 LDA #0:STA gotpage
6490 LDA rollflag
6500 BEQ noroll
6510 LDA #&86:STA reqpa
ge
6520 .noroll
6530 JSR transmitandget
reply
6540 JSR cursorbottom
6550 LDA replybuffer
6560 BNE replyerror
6570 JSR printtext
6580 OPT FNequs("Item "
)
6590 BRK
6600 LDA replybuffer+1
6610 JSR printdecimal
6620 JSR printtext
6630 OPT FNequs(" in qu
eue")
6640 BRK
6650 RTS
6660 .replyerror
6670 STA errorflag
6680 LDA #7:JSR oswrch
6690 LDX #1
6700 .replyerrorloop
6710 LDA replybuffer,X
6720 CMP #13
6730 BEQ exitreplyerror
6740 JSR &FFEE:INX
6750 JMP replyerrorloop
6760 .exitreplyerror
6770 PLA:PLA
6780 LDX #0
6790 JMP testcharinput
6800 .transmitandgetrep
ly
6810 JSR setupreplyrx
6820 .setupandretry
6830 JSR setuptx
6840 LDA st:STA txblk+2
6850 LDA st+1:STA txblk
+3
6860 JSR calltx
6870 JSR polltx
6880 CMP #0:BEQ ok
6890 PHA:JSR wait:PLA
6900 CMP #&42
6910 BEQ setupandretry
6920 CMP #&41
6930 BEQ setupandretry
6940 PHA
6950 JSR cursorbottom
6960 PLA
6970 CMP #&40
6980 BEQ linejammed
6990 CMP #&43
7000 BEQ noclock
7010 .noclock
7020 BRK
7030 OPT FNequb(&43)
7040 OPT FNequs("No clo
ck")
7050 .linejammed
7060 BRK
7070 OPT FNequb(&40)
7080 OPT FNequs("Line j
ammed")
7090 BRK
7100 .ok
7110 LDX rxno2
7120 JSR pollrx
7130 CMP #&80
7140 BCC ok
7150 LDA rxno2:STA rxbl
k
7160 JSR readrx
7170 .testescape
7180 BIT &FF
7190 BPL noescape
7200 JSR cursorbottom
7210 LDA #4:LDX #0
7220 JSR osbyte
7230 LDA #&7C:JSR osbyt
e
7240 JSR cursoron
7250 JSR logoff
7260 JSR delete
7270 JSR printtext
7280 OPT FNequs("Escape
")
7290 BRK
7300 LDA brkstore
7310 STA brkv
7320 LDA brkstore+1
7330 STA brkv+1
7340 LDA #13:LDX #5
7350 JSR osbyte
7360 SEI
7370 LDA oldeventvector
7380 STA &220
7390 LDA oldeventvector
+1
7400 STA &221
7410 CLI
7420 PLA:PLA
7430 .noescape
7440 RTS
7450 .setuppagerx
7460 LDX #12
7470 .moverxloop
7480 LDA rxpage,X
7490 STA rxblk,X
7500 DEX:BPL moverxloop
7510 LDA st+1:STA rxblk
+4
7520 LDA st:STA rxblk+3
7530 JSR setuprx
7540 STA rxno
7550 RTS
7560 .setupfindserverre
plyrx
7570 LDX #12
7580 .movefindrxloop
7590 LDA rxserverblk,X
7600 STA rxblk,X
7610 DEX
7620 BPL movefindrxloop
7630 JSR setuprx
7640 STA rxno2
7650 RTS
7660 .setupreplyrx
7670 LDX #12
7680 .movereplyrxloop
7690 LDA rxreply,X
7700 STA rxblk,X:DEX
7710 BPL movereplyrxloo
p
7720 LDA st+1:STA rxblk
+4
7730 LDA st:STA rxblk+3
7740 JSR setuprx
7750 STA rxno2:RTS
7760 .setupheaderrx
7770 LDX #12
7780 .moveheaderloop
7790 LDA rxheader,X
7800 STA rxblk,X:DEX
7810 BPL moveheaderloop
```

Continued ▶

◀ **Network Page listing 3 continued**

```
7820 LDA st+1:STA rxblk
+4
7830 LDA st:STA rxblk+3
7840 JSR setuprx
7850 STA rxno1
7860 RTS
7870 .home
7880 LDA #30:JMP oswrch
7890 .cursorbottom
7900 LDA #13:LDX #5
7910 JSR osbyte
7920 LDA #31:JSR oswrch
7930 LDA #0:JSR oswrch
7940 LDA #24:JSR oswrch
7950 JSR printtext
7960 OPT FNequs(STRING$
(20," "))
7970 BRK
7980 LDA #31:JSR oswrch
7990 LDA #0:JSR oswrch
8000 LDA #24:JSR oswrch
8010 LDA #14:LDX #5:JSR
osbyte
8020 JSR settimeback
8030 RTS
8040 .cursoron
8050 LDA #23:JSR oswrch
8060 LDA #1:JSR oswrch
8070 JSR oswrch
8080 JSR paddingzeros
8090 RTS
8100 .cursoroff
8110 LDA #23:JSR oswrch
8120 LDA #1:JSR oswrch
8130 .paddingzeros
8140 LDX #8
8150 .cursorloop
8160 LDA #0:JSR oswrch
8170 DEX:BNE cursorloop
8180 RTS
8190 .delete
8200 LDX rxno:LDA #&34
8210 JSR osbyte
8220 LDX rxno1:LDA #&34
8230 JSR osbyte
8240 LDX rxno2:LDA #&34
8250 JSR osbyte
8260 RTS
8270 .calltx
8280 LDX #txblk MOD 256
8290 LDY #txblk DIV 256
8300 LDA #&10:JSR oswor
d
8310 RTS
8320 .polltx
8330 LDA #&32:JSR osbyt
e
8340 TXA:CMP #&80
8350 BCS polltx
8360 RTS
8370 .broadcast
8380 LDX #bcast MOD 256
8390 LDY #bcast DIV 256
8400 LDA #&10:JSR oswor
d
8410 RTS
8420 .pollrx
8430 LDA #&33:JSR osbyt
e
8440 TXA
8450 RTS
8460 .zeroflag OPT FNeq
ub(0)
8470 .printdecimal
8480 LDY #0:STY zerofla
g
8490 LDX #255
8500 .hunloop
8510 INX
8520 SEC:SBC #100
8530 BCS hunloop
8540 PHA:TXA:JSR digit
8550 PLA:CLC:ADC #100
8560 LDX #255
8570 .tenloop
8580 INX
8590 SEC:SBC #10
8600 BCS tenloop
8610 PHA:TXA:JSR digit
8620 PLA:CLC:ADC #10
8630 JSR digit
8640 RTS
8650 .digit
8660 CMP #0
8670 BNE oktoprint
8680 BIT zeroflag
8690 BPL suppressprint
8700 .oktoprint
8710 DEC zeroflag
8720 ORA #48:JSR oswrch
8730 .suppressprint
8740 RTS
8750 .setuprx
8760 LDX #rxblk MOD 256
8770 LDY #rxblk DIV 256
8780 LDA #&11:JSR oswor
d
8790 LDA rxblk
8800 RTS
8810 .printtext
8820 CLC:PLA:ADC#1
8830 STA printptr
8840 PLA:ADC#0
8850 STA printptr+1
8860 TYA:PHA
8870 LDY #0:BEQ print3
8880 .print2
8890 JSR osasci
8900 .print3
8910 LDA (printptr),Y
8920 INC printptr
8930 BNE print4
8940 INC printptr+1
8950 .print4
8960 CMP #0:BNE print2
8970 PLA:TAY
8980 JMP (printptr)
8990 .readrx
9000 LDX #rxblk MOD 256
9010 LDY #rxblk DIV 256
9020 LDA #&11:JSR oswor
d
9030 RTS
9040 .localnumber
9050 OPT FNequb(8):OPT
FNequw(0)
9060 .timedelay OPT FNe
qub(0)
9070 .st OPT FNequw(0)
9080 .gotpage OPT FNequ
b(0)
9090 .rollflag OPT FNeq
ub(0)
9100 .nfsflag OPT FNequ
b(0)
9110 .rxno OPT FNequb(0
)
9120 .rxno1 OPT FNequb(
0)
9130 .rxno2 OPT FNequb(
0)
9140 .tb OPT FNequd(-ev
enttime)
9150 OPT FNequb(&FF)
9160 .timeset
9170 OPT FNequd(0):OPT
FNequb(0)
9180 .timeread
9190 OPT FNequd(0):OPT
FNequb(0)
9200 .flagspecific OPT
FNequb(0)
9210 .bcast OPT FNequb(
&80)
9220 .findport OPT FNeq
ub(findserverport)
9230 OPT FNequw(&FFFF)
9240 .specificfindserve
r
9250 OPT FNequs("TELETE
XT")
9260 .specifictx
9270 OPT FNequb(&80)
9280 .findport OPT FNeq
ub(findserverport)
9290 OPT FNequw(0)
9300 OPT FNequd(specifi
cfindserver OR &FFFF0000
)
9310 OPT FNequd((specif
icfindserver+8) OR &FFFF
0000)
9320 .rxblk
9330 OPT FNequw(&7F00)
9340 OPT FNequb(0)
9350 OPT FNequw(0)
9360 OPT FNequd(0):OPT
FNequd(0)
9370 .rxserverblk
9380 OPT FNequw(&7F00)
9390 OPT FNequb(serverr
esponseport)
9400 OPT FNequw(0)
9410 OPT FNequd(buffer
OR &FFFF0000)
9420 OPT FNequd((buffer
+&400) OR &FFFF0000)
9430 .rxpage
9440 OPT FNequw(&7F00)
9450 .pagereceiveport O
PT FNequb(0)
9460 OPT FNequw(0)
9470 OPT FNequd(buffer
OR &FFFF0000)
9480 OPT FNequd((buffer
+&400) OR &FFFF0000)
9490 .rxreply
9500 OPT FNequw(&7F00)
9510 .serverreplyport O
PT FNequb(0)
9520 OPT FNequw(0)
9530 OPT FNequd((buffer
+&400) OR &FFFF0000)
9540 OPT FNequd((buffer
+&420) OR &FFFF0000)
9550 .rxheader
9560 OPT FNequw(&7F00)
9570 .pageheaderport OP
T FNequb(0)
9580 OPT FNequw(0)
9590 OPT FNequd(header
OR &FFFF0000)
9600 OPT FNequd((header
+8) OR &FFFF0000)
9610 .reqpage
9620 OPT FNequb(&81)
9630 .pagerequestport O
PT FNequb(0)
9640 OPT FNequw(0)
9650 OPT FNequd(pageinp
ut OR &FFFF0000)
9660 OPT FNequd((pagein
put+20) OR &FFFF0000)
9670 .txblk
9680 OPT FNequs(STRING$
(12,CHR$ 0))
9690 .input
9700 OPT FNequw(pageinp
ut+1)
9710 OPT FNequb(3)
9720 OPT FNequw(&FF00)
9730 .stackstore OPT FN
equb(0)
9740 .brkstore OPT FNeq
uw(0)
9750 .star
9760 OPT FNequw(starbuf
f)
9770 OPT FNequb(39)
9780 OPT FNequw(&FF00)
9790 .starbuff
9800 OPT FNequs(STRING$
(40,CHR$ 0))
9810 .cinput
9820 OPT FNequw(channel
input)
9830 OPT FNequb(1)
9840 OPT FNequw(&FF00)
9850 .linecount OPT FNe
qub(0)
9860 .xline OPT FNequb(
0)
9870 .channelinput OPT
FNequw(0)
9880 .header OPT FNequd
(0)
9890 OPT FNequd(0)
9900 .pageinput
9910 OPT FNequs("1100")
9920 OPT FNequb(13)
9930 OPT FNequd(0)
9940 .buffer
9950 ]
9960 replybuffer=buffer
+&400
9970 NEXT
9980 :
9990 PROCchecksum(&6E00
,buffer-1,&44988)
10000 PRINT "Press space
 to save code"
10010 IF GET=32 THEN PRO
Coscli("SAVE TELETEXT 6E
00 "+STR$~buffer)
10020 END
10030 :
10040 DEF FNequb(byte)
10050 ?P%=byte
10060 P%=P%+1
10070 =pass
10080 :
10090 DEF FNequw(word)
10100 !P%=word AND &FFFF
10110 P%=P%+2
10120 =pass
10130 :
10140 DEF FNequd(dword)
10150 !P%=dword
10160 P%=P%+4
10170 =pass
10180 :
10190 DEF FNequs(string$
)
10200 $P%=string$
10210 P%=P%+LEN string$
10220 =pass
10230 :
10240 DEF PROCoscli(stri
ng$)
10250 DIM X% 50
10260 $X%=string$
10270 Y%=X% DIV 256
10280 CALL &FFF7
10290 ENDPROC
10300 DEF PROCchecksum(s
t%,end%,sum%)
10310 S%=0
10320 FOR I%=st% TO end%
10330 S%=S%+?I%
10340 NEXT
10350 IF S%=sum% THEN EN
DPROC
10360 PRINT "Please chec
k listing"
```

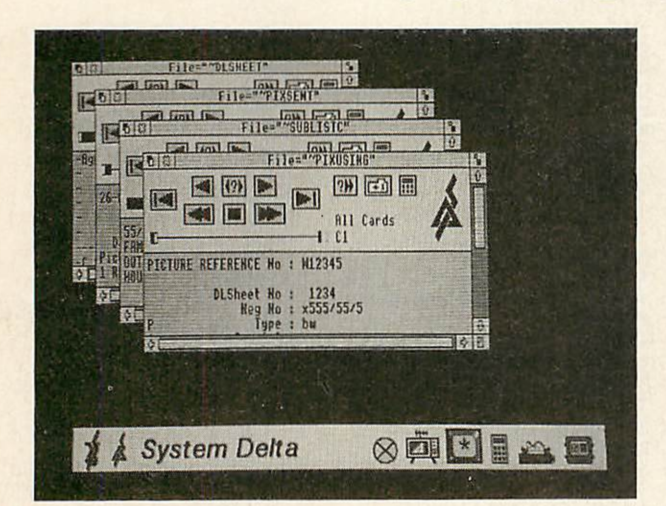
TELESOFTWARE

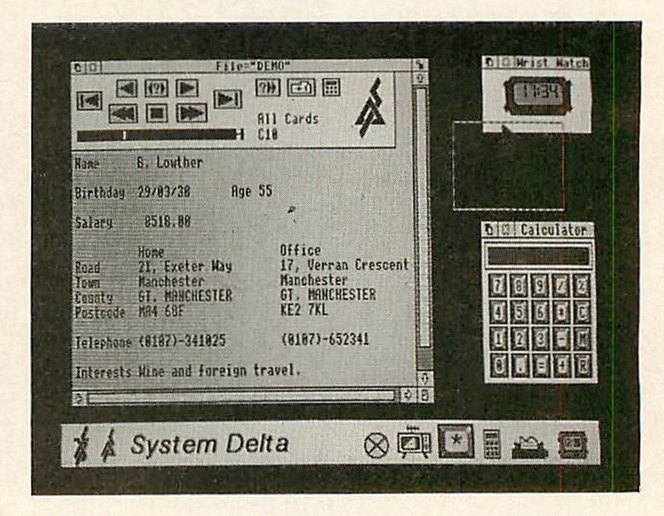
Although these programs allow you to view all the teletext pages, you cannot download telesoftware programs directly. If however, you have direct access to an adapter, you can make use of the service.

As from August, the BBC will be transmitting a selection of programs from Acorn User *on their Ceefax service. These include a few from this month plus one or two from previous issues. You can download the programs using any teletext adapter from Acorn, Morley or GIS. They can be accessed via the telesoftware index on page 700.*

OFFERS

SYSTEM DELTA





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COMPUTER STUDIES

Sir, I am about to choose my third year options at school, and am writing about the practical use of computer studies. I feel that the computer is one of the most exciting teaching aids for pupil and teacher alike, and should be promoted as such. Wordprocessing is an immensely useful tool. Databases and graphics can be exploited in nearly every subject. But computer studies itself is not really needed; at the moment it is merely an extension of physics, maths and CDT.

I think that the material used in teaching computer studies has a very narrow spectrum. During the past two terms I have learned the basics of information storage using OPENIN and the like, and also that an interface box will allow relays to be switched on and off to allow crude control of a motorised toy. Is this what employers want? Will Britain rely on PRINT# and INPUT# for its storage of data?

Some will say that IBM compatibility is being introduced with the Nimbus, but all these machines with superb graphics are doing is running BBC Basic 86, Microsoft *Word* and *PC Paint*. There must be something wrong.

I have nothing against the teaching of computer science. However I cannot find any practical use for this subject which cannot be achieved by extending existing subjects.

G Preston
Henley

Design your own forms

A BIGGER ORGANISER

Sir, I own a BBC B with a Solidisk 32k sideways RAM and also a Panasonic KX-1082 printer. I use a commercial organiser and am very impressed with it. However, I would like to use the design sequences to design invoices, etc, for my business, on A4 paper. The supplier of the program says it would be difficult to amend the program.

R E Wood
Northampton

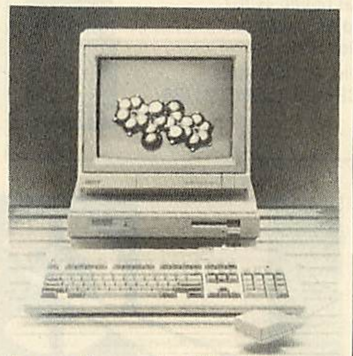
It would indeed be difficult to amend the program to cope with paper larger than a personal organiser. But Mewsoft (on 01-267 2642) produces a program called A4 Form Designer that should suit. It costs £9.95.

ATARI TO ARC

Sir, I have recently upgraded from an Atari ST to an Archimedes and I'm very pleased with it. After selling the ST, I had a 3.5-in disc drive left over. It ran perfectly on the ST and I was wondering if I could connect it to the Arc?

J Timmins
Kingswinford

3.5-in drives could be fitted into the Arc's case, but you would have to make up a small U-shaped mounting bracket to hold the drive at the correct angle, and modify the grey plastic fascia. If mounting the drive externally, you will need one of the special interfaces, as without it you can damage the Arc. Either a 3.5-in drive or a 5.25-in unit can be added. Suitable interfaces are available from CJE Micros, Watford Electronics, Beebug and others.



Arc can have extra drive

KEY SOLUTION

Sir, I read with interest the review of educational databases in the May issue of *Acorn User*. Having used *Key* at school, I know the problem of having to swap the discs can be overcome by using either a double-sided or dual disc drive. In both cases the *Key* program disc is used in drive 0 while the data disc is in drive 2 or 1 respectively. Once the data disc has been entered as drive 2 or 1 the disc doesn't have to be swapped.

D Gibson
Houghton-le-Spring

CO-PROCESSOR CONFUSION

Sir, can co-processors designed for the IBM PC, such as the Intel 8087, be used with the Beeb? Can you just use a Co-Pro adapter? The Intel processors seem fairly cheap, about £100 for an 8087. If they were introduced into the system, could memory cards be added as well? If this is possible, the power of the Beeb could be magnified unbelievably.

B Mumford
Wimbourne

No. The 8087 is a dedicated floating-point maths chip, which can only work with the right circuitry. This circuitry is usually built into an IBM PC – but not a BBC micro. And it isn't even cheap – the £100 8087 is just a single chip.

Acorn co-processors are 'whole computers' on boards which plug straight into a Master 128, or into a model B or B+ via a Watford Co-Pro adapter or Acorn Universal Second Processor adapter. The 65C102 co-processor doubles the speed of the BBC micro with most software, and the 512 co-processor gives you a good measure of IBM PC compatibility.

In fact, IBM PC co-processors and expansion cards have more in common with Archimedes podules and co-processors. The planned floating point maths podule is based around a chip similar to the 8087. But although similar in concept, you can't put IBM cards in an Archimedes.

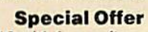
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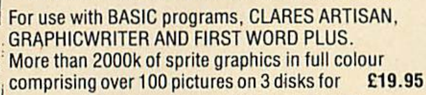
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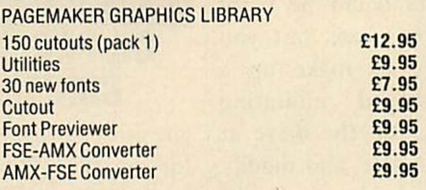
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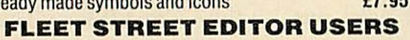
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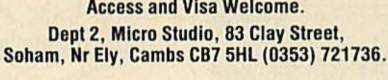
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Z88 PLUS INTERWORD

Sir, I have recently used the article 'Have Micro – Will Travel' (*Acorn User,* January) to link my Z88 to my BBC micro. After a bit of teething trouble with the cable, the transfer system has worked extremely well.

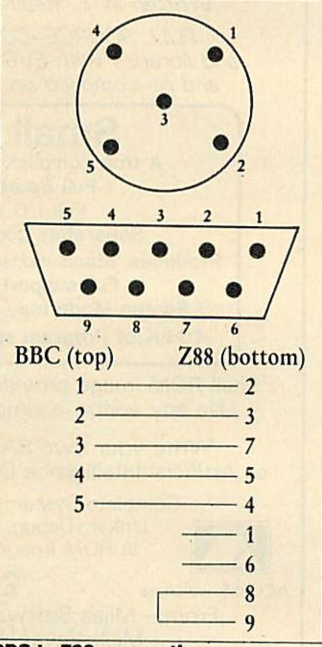
Pipedream files transfer perfectly well to *InterWord* as they are, but it is better to load them at the cursor on an opened blank *InterWord* file. To transfer *InterWord* files to *Pipedream* it is necessary to produce a spool file without codes, but *Pipedream* doesn't object to being fed a complete *InterWord* file in error. Because *InterWord* marks the beginning of each text line by adding &80 to the ASCII value of the first character, these non-printable characters are shown as blue squares in *Pipedream,* so a straight file can only be used if you are willing to do a fantastic amount of editing.

Carriage return characters are recognised in both directions so the basic text layout is unaltered. However, *Pipedream* doesn't automatically wrap the end of an existing line on to the next line, so it is necessary to set the margin width in *Pipedream* to the same as that used in the *InterWord* file.

W H James
Letchworth

The wiring diagrams given with the Z88 article are reproduced above. Each view looks into the socket, or the back of the plug. The numbering of the pins on the BBC micro serial port is confusing because different brands of plug are numbered or lettered in different ways.

Whatever way your plug is numbered, it is the location of the pin that is important (ie, the central one is Ground, and must be connected to the Z88 pin 7). There is usually a cutout in the metal shell of the DIN plug too – it doesn't matter whether this goes at the top or the bottom, but decide before you wire up the lead and keep it that way.



BBC to Z88 connections

COMPACT DFS DISCS

Sir, I am the owner of a Master Compact and wish to upgrade the system by adding a 5.25-in disc drive and a DFS ROM. I would like to know if DFS can be used on the Compact's standard 3.5-in drive if the ROM is fitted.

J P McRae
Guildford

The 1770 DFS can be used on the Compact's built-in drive, and the ROM image should be on your Welcome disc. If it's not, get the latest disc from Acorn. With any two drives, *MOUNT (ADFS) and *DRIVE (DFS) are used to switch between drives.

SEEING CEEFAX

Sir, I own a BBC B and a television with teletext and an RGB socket. I would like to be able to download software and other pages from Ceefax.

I know that I need a lead from the computer to the RGB TV socket but I don't know if any other software is needed. Could you recommend some?

A J Wilkins
Bicester


Adapter needed for CEEFAX

You can't download pages from teletext using your television. The RGB socket on your TV only allows you to use it as a monitor, to display the computer's screen output. It can't be used to transfer data from the TV to the computer. To download Ceefax or telesoftware, you need a teletext adapter from Morley or the BBC itself. Each comes with the appropriate software to allow downloading.

PRINTING CIRCUIT BOARDS

Sir, J Clyde (Letters, May) reported trouble in obtaining a usable print-out from Joe Telford's PCB design program (*AU,* December 1987). The vertical spacing of the drawing was apparently incorrect.

This is probably due to many screen dumps using different horizontal and vertical scales, and is commonly experienced as circles appearing as flattened ellipses when dumped. Mr Clyde may be able to resolve his problem by including in the string of printer codes VDU 1,27,1,42,1,4 which works with many, if not all, Epson-compatible printers. Martin Phillips gave a full explanation in his Hints and Tips article in the May 1987 issue.

H J Henson
Kilmarnock

REPLACING RAM CHIPS

Sir, I have a BBC B issue 4 machine with disc drive and Acorn DFS 0.9. I bought *Life of Repton* (my son insisted, and that's my excuse) only to find that it will not run on my machine. However, I borrowed an old BBC with an issue 3 board on which it works OK.

I assumed that my machine had a fault somewhere so I wrote a memory test routine and discovered not one but two faulty locations at &4B4F and &5B4F. The test was to write &55 and &AA to each address and then read it back. From this I found that &55 returned as &75 which pointed to bit 5 of the data bus for these locations. I subsequently deciphered that this was being contained in IC66.

After changing IC66 for a new chip supplied by Watford I found that the fault was still present. Do I need to find a chip with a very fast access time to clear this fault?

W A Hewitt
Birmingham

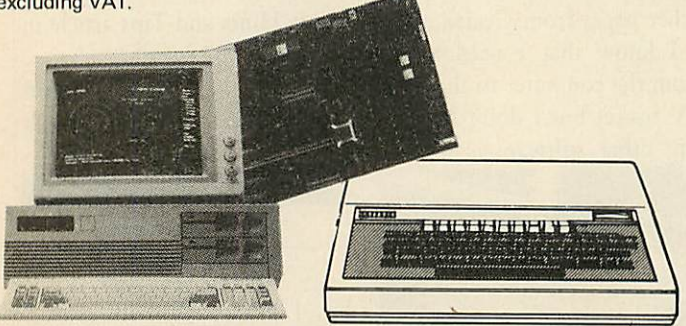
Memory faults such as these can stop any program which uses that area of memory. IC66 should be replaced with a 4816-11 RAM chip, but as you've done this already, take a careful look at the surrounding tracks too.

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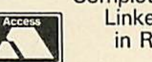
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STRATEGY REVIEW

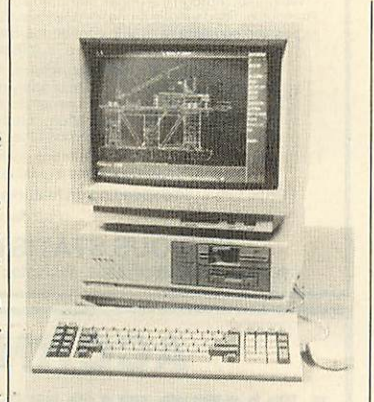
Sir, LEAs are currently in the process of reviewing their computer hardware and software strategy for schools. This is largely in response to the DES' Information Technology in Schools initiative. Possibly for the same reason, more hardware manufacturers are seeing education as an important market. And recognising that compatibility between machines and software is regarded as an important consideration by those in education, manufacturers are claiming that their products have that compatibility.

LEAs are right to want maximum compatibility, because of the substantial investments that have been made in purchasing educational software and associated curriculum materials, and in training staff to use them effectively. But it is difficult for LEAs to interpret the claims of manufacturers with regard to the practical aspects of their particular situation.

The National Council for Educational Technology is therefore undertaking an urgent assessment of a selection of the new 16- and 32-bit computer systems, to determine the extent to which each of those systems will interconnect with the range of hardware already in the schools and the extent to which such systems will run existing educational software in common use.

The council is proposing to complete this study by the end of October 1988. Detailed and objective advice can then be provided to LEAs in time for it to be used when deciding purchasing policies for the present financial year.

Dr Noel Thompson
Chief Executive
National Council for
Educational Technology



Nimbus VX: one new system

Readers who have had experience in using software on the new machines, (the Macintosh, IBM PC, Archimedes and Nimbus AX and VX for example) should contact Dr Thompson at NCET, 3 Devonshire Street, London, W1N 2BA

COLD POWER

Sir, Joe Telford's 'Blowing Hot and Cold' in the May 1988 *Acorn User* draws attention to the use of a real-time temperature plotting program to save energy costs.

I have been using the BBC model B for four years to monitor temperatures inside and outside the house, also the temperatures within the refrigerator and in the pipes to the central heating radiators.

The passage of warm and cold weather fronts make good viewing; the most rapid rise of temperature I ever noticed was on the night of October 15 last year as the big storm approached. The cycling of the refrigerator shows up wasteful patterns of use, and the saving when thawing frozen goods in the refrigerator is obvious from the trace.

However, there is a problem. This application requires the computer to be in almost continuous use. I find that after every two years the power supply becomes unhappy. It will start and run when warm, but it will not start from cold. This is probably due to failure of a single component, but we are expected to replace the entire unit at about £60. Has anyone else experienced this problem and found a cheaper solution other than leaving it on all the time.

John Chambers
Surrey

There is a similar problem with network fileservers, which are often left on almost continuously. It arises because capacitors used in the power supply degrade. Power supplies are not easy to repair, but Riverside Systems (Unit 15, Riverside Workshops, 28 Park Street, London SE1 9AB) will replace broken power supplies with reconditioned units for £40.

LIMITS OF ARC

Sir, I agree entirely with the points made by R York (Letters, July 1988) about the expandability of the Archimedes.

Although 1Mbyte appears to be a lot of memory, it is already obvious that many users will find it insufficient. The MS-DOS emulator is limited in 1Mbyte machines, and there will certainly be little memory spare for RAM discs and printer buffers. Many users will want the ROM and interface podules and this will be the limit for the hardware expansion of the 300 series.

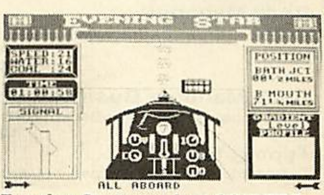
Although the raw power of the Archimedes is very attractive, the Atari ST and the Commodore Amiga (which has just come down in price), have more users and software, and are half the price of a 300 series machine. The justification for paying for an Archimedes is as much the knowledge and software that BBC micro owners have built up, as the very high performance.

I would like to buy an Archimedes but am reluctant to buy a 300 series machine and cannot possibly afford an A440. With the continuing absence of the A410 from the range, this means that I wait and may be attracted by another machine in that time.

John Haines
London

PLAYING GAMES

Sir, while trying to run certain disc-based BBC games on Master 128s in my place of work, I find that some refuse to load and some have corrupted graphics. Is there any command that can be entered to make the Master emulate a Beeb more accurately?



Evening Star: requires CONVERT

Thomas Crossey
Merseyside

The majority of BBC games will work on the Master 128, but sometimes they need a little 'tweaking'. Corrupted graphics are often caused by loading character definitions into the wrong memory.

This problem arises because the model B and Electron models use a memory at &B00 to store user-defined characters, whereas the Master uses &8900 for all its characters. There is a utility on the Master Welcome disc called 'CONVERT' that will sort out this problem.

ACORN USER ADVERTISEMENT PAGES – AUGUST 1988

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MASTER 128, green and colour monitor, 40/80T D/S drive, manuals, Plinth. All Immaculate, £600. Tel: Peterborough (0733) 72887.

BBC B Shadow RAM, 4meg board, SWR (32k), 40T disc drive, many ROMs plus discs, £300 ono. Tel: (0323) 846298 Eastbourne.

ACORN Electron software for sale. Games include *Blagger* and lots more. Tel: Luton (0582) 667467 eves, ask for Richard.

BBC B with 1770 DFS and ADFS, £250. 2764 and 27128 EPROM programmer and EPROM eraser, £30. Tel: David, Edinburgh 031-447 1200.

BBC B, single drive, SWR128 blank discs, games discs, joystick covers, £700 (worth £1000). Tel: 01-556 7618.

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MASTER reference manual part 1, brand new, £10. Tel: Russ (0252) 702802 (Elstead, Surrey).

BRAND new Watford 3.5-inch double sided 80T disc drive, £60. Tel: Cheltenham (0242) 36992.

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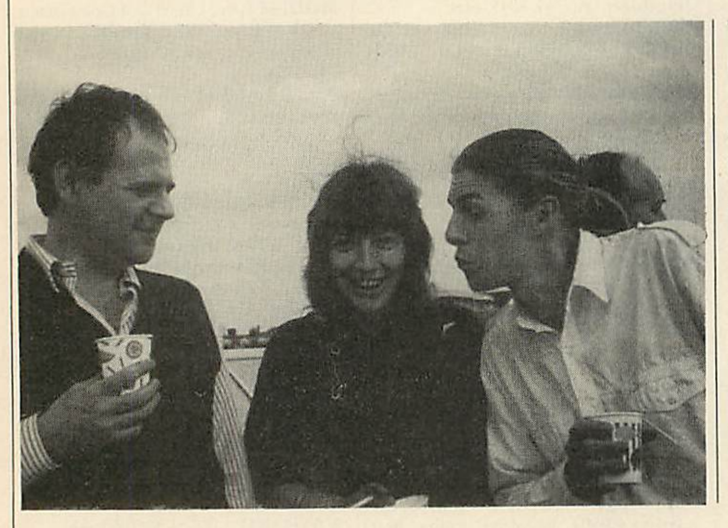
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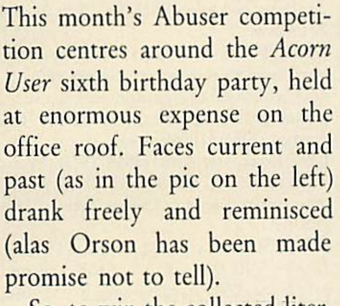
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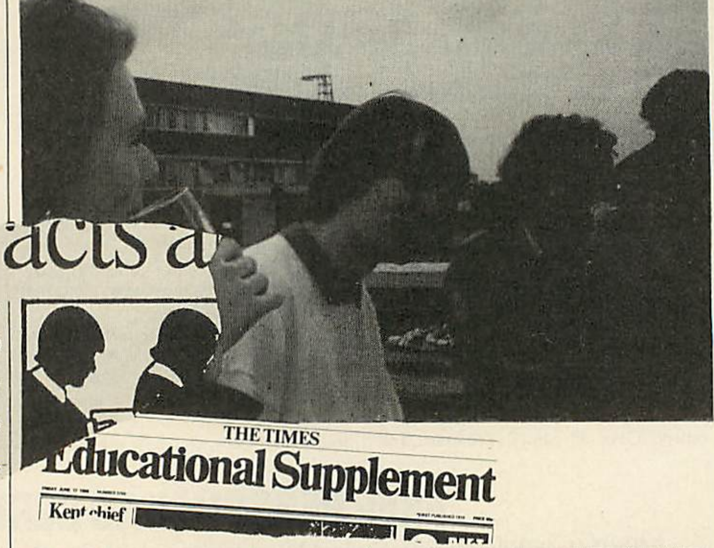
Now we are six

What do *AU* contributors do in their spare time? Programmer **Dave Lawrence** (in the middle) apparently writes sex education manuals reviewed in the August *Times Ed*. Fellow David **Dave Acton** (left) and technical Ed **Rob Miller** drank to his success and their excess.



This month's Abuser competition centres around the *Acorn User* sixth birthday party, held at enormous expense on the office roof. Faces current and past (as in the pic on the left) drank freely and reminisced (alas Orson has been made promise not to tell).

So, to win the collected literary works of Alex van Someren (actually, a useful piece of *Acorn User* software) entrants must offer suggestions as to just what **Mad Alex** (left with ponytail) could have been saying to quizmaster emeritus **Simon Dally** and former inhabitant of the Redwood dungeon **Kitty Milne**.



Facts a

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Macmillan with TALC £1.95. 0 333 43975 9.

Books on sex education and perso relationships for young people many different forms. Some. recent *Diary of a Teen Freak*, attempt a lingo, while sober appr category



Tony Quinn and **Graham Bell** apply all their technical skill to finding the Econet jack on a long and unruly piece of cabling. No-one dared tell them it was silly string.

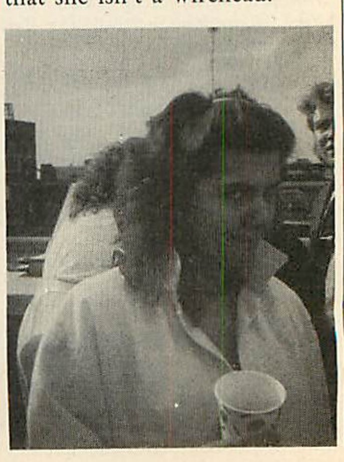


Now we'll never believe production assistant **Colette Curley**, however much she swears that she isn't a wirehead.

Going going gone. . .

Sadly several guests wandered off never to be seen again. Among them were ad production person **Jonathan Marsh** (right), kidnapped by *Design Week*, and news editor **Carol Atack** (left) lured to *Hi-Fi News* with the promise of all the CDs she could eat.





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